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ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 8/8  
BIRDS POINT-NEW MADRID FLOODWAY OPERATION.(U)  
APR 78

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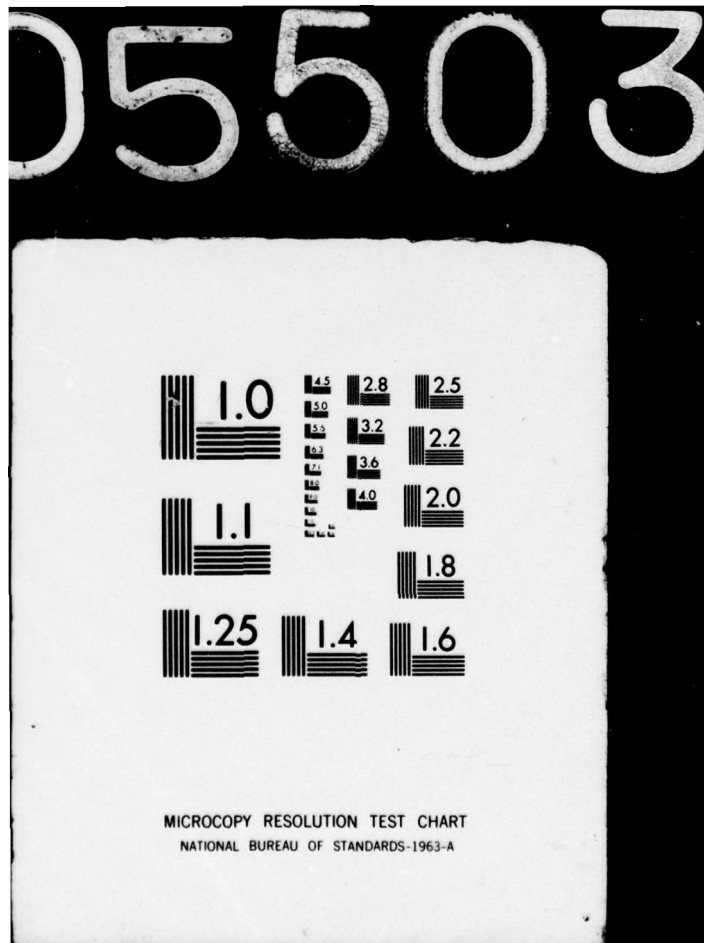
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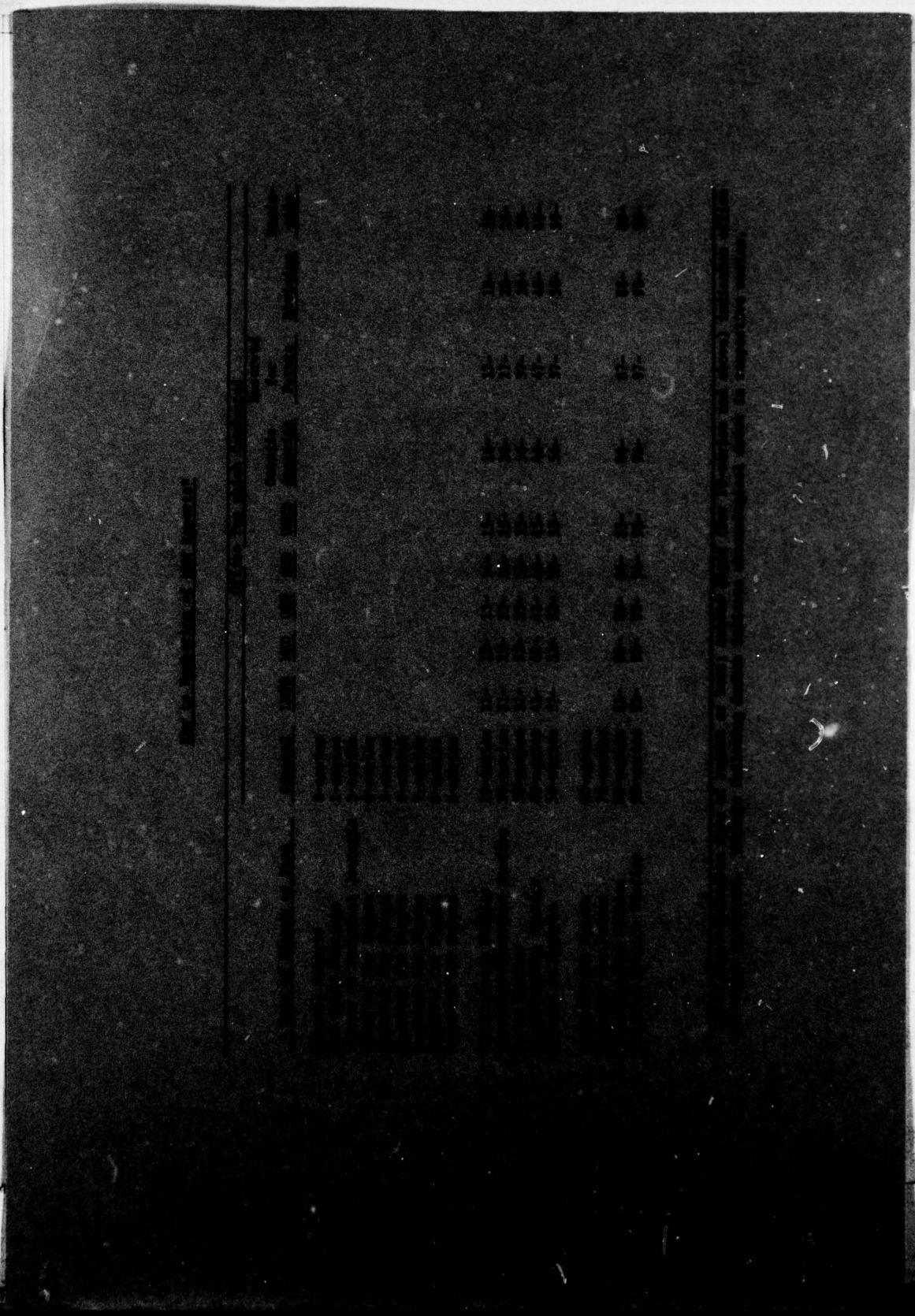
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## CONTENTS

	<u>Page</u>
Authority . . . . .	1
The Prototype . . . . .	1
Purpose of Tests . . . . .	2
The Model . . . . .	3
Test Procedure . . . . .	3
Test Results . . . . .	5
Tables 1-5	
Plates 1-57	

BIRDS POINT-NEW MADRID FLOODWAY OPERATION

Hydraulic Model Investigation

Authority

*ABSTRACT* →

1. The U. S. Army Engineer District, Memphis (LMM), requested the tests reported herein in letter of 19 August 1974, subject: FC, MR&T Mississippi River Levees, Request for Model Tests - Birds Point-New Madrid Floodway. The tests were conducted on the Mississippi Basin Model (MBM) at the U. S. Army Engineer Waterways Experiment Station (WES), Jackson Installation, Jackson, Mississippi, during the period 15 February-15 April 1975. Personnel from the Lower Mississippi Valley Division (LMVD) and LMM visited the model during the testing program to review test results. Preliminary test results were furnished LMM at the completion of the testing program.

*ABSTRACT* → The Prototype

2. The Birds Point-New Madrid Floodway is located on the right (west) bank of the Mississippi River in Mississippi and New Madrid Counties, Missouri, just below the confluence of the Ohio and Mississippi Rivers (Plate 1). The floodway is 33 miles long and up to 10 miles wide in places, and includes 205 square miles of alluvial valley land. The floodway is enclosed by Mississippi River project levees except for a 1500-ft gap at the

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DDC	Buff Section <input type="checkbox"/>
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downstream end that provides a drainage outlet and an inlet for flood backwater (Plate 2). When the stage reaches 55 ft on the Cairo gage, 56 percent of the floodway (74,000 acres) is inundated by backwater through the gap. The floodway frontline levee consists of three parts: the upper fuseplug section, 11 miles in length; the lower fuseplug section, 5 miles in length; and the section between the two fuseplugs.

3. The floodway was authorized in Flood Control Act of May 15, 1928, as a means of protection for Cairo, Illinois, and a limited area in southern Illinois and southeast Missouri. This act authorized sufficient lowering of the upper fuseplug section of the frontline levee to permit operation of the floodway to begin at a stage of 55 ft (325.5 ft msl) on the Cairo gage. The Flood Control Act of 1965 authorized raising the fuseplug sections of the floodway levee to 60 ft on the Cairo gage with the stipulation that the floodway will normally not be placed in operation until a flood of 60 ft on the Cairo gage is predicted, but reserving the right of the United States to crevasse the levee when the stage at Cairo is 58.0 ft and is forecast to exceed 60.0 ft.

#### Purpose of Tests

4. Past experience has shown that levee crevasses vary considerably in length, depth, and rate of development, depending upon the condition of the levee, the magnitude of the flood, and the period of time the water is against the levee. These tests were conducted to determine the effect on

flood stages of varying the number, length, depth, and time of development of crevasses in the Birds Point-New Madrid Floodway Frontline Levee to assist the LMM in developing a plan of operation for the floodway.

#### The Model

5. The tests reported herein were conducted on the Mississippi River portion of the MBM from Thebes, Illinois, to Memphis, Tennessee, including the Ohio River from Golconda, Illinois, to its mouth. The MBM, including appurtenances, instrumentation, and operating procedure, is described in detail in MBM Report 1-4, Description of Mississippi Basin Model, dated July 1951.

6. Before tests were undertaken, the Birds Point-New Madrid Floodway Frontline Levee was graded to elevations furnished by the LMM as given in Table 1, and the test reach of the model was adjusted to reproduce stages and discharges for the period 3 March to 11 May 1973. Tailwater effects below Memphis were simulated by holding the Memphis gage to prototype stages. The inflows used and the resulting model stages and discharges are shown compared with prototype data in Plates 3-11.

#### Test Procedure

7. Flows for Hypothetical Flood M58AOREN (PDF) were introduced in the test reach and routed to Memphis where water-surface elevations were

held to a rating curve developed from results of model tests presented in MBM Report 29-1, Comprehensive Testing Program, dated November 1971 (Plate 12). Levees were crevassed according to instructions from LMM; crevasse details are given in paragraph 8. Crest water-surface elevations were recorded on each side of the frontline levee crevasses for each test. These elevations were taken at a distance one third of the crevasse length from the upstream end of the crevasse. Stage hydrographs were recorded at all model gaging stations and discharge hydrographs were obtained at Memphis.

8. Eleven tests (A-K) were conducted varying only the number, length, depth, and method of crevassing the inflow and outflow crevasses in the floodway frontline levee. Three inflow crevasses in the frontline levee (No. 1 at levee sta\* 34/10, No. 2 at 35/05, and No. 3 at 41/33), when operated, were initiated when the stage at Cairo reached 60 ft (330.5 ft msl). Tests were conducted with these crevasses 1200 ft long, 2400 ft long, and 2400 ft long plus additional length to simulate the effect of a blue hole\*\* (this length was the same as that used in the Comprehensive Testing Program discussed in MBM Report 29-1). Two outflow crevasses in the floodway frontline levee (No. 1 at levee sta 69/40 and No. 2 at 84/30), when operated, were initiated 12 hours after the lower fuseplug section was

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\*Crevasse locations are given at the upstream end of the crevasse. Location of each crevasse is the same for all tests except for inflow crevasse No. 2 for Test I which began at levee station 35/11+86, the downstream end of crevasse No. 1 for this test.

\*\*Blue hole is the name given the large hole which is formed in the natural ground in the vicinity of a levee crevasse. These holes are created by the erosive action of currents through a levee crevasse when operating under a high head.



overtopped. Three Madrid Bend levee crevasses, No. 1 at Levee Mile Post (LMP) 6/20, No. 2 at 7/70, and No. 3 at 8/60; one Tiptonville-Obion levee crevasse at LMP 4/00; and one Booth Point levee crevasse at levee sta 83+00 were initiated for each test 12 hours after the respective levee was overtopped. The rates of progressive enlargement of crevasses were determined from the rates required to duplicate the prototype stages of the 1973 Flood. A list of crevasses operated for each test, and the total length and time of initiation of each crevasse are given in Table 2. The sequential development of each crevasse is given in Table 3.

#### Test Results

9. The crest head differential at each crevasse in the floodway frontline levee is presented in Table 4, and the crest water-surface elevations at model gaging stations are presented in Table 5. Inflow hydrographs and the resulting stage and discharge hydrographs recorded at model gaging stations are presented in Plates 13-57.

10. Model test results indicate that:

- a. Operating three 2400-ft-long inflow crevasses (Nos. 1, 2, and 3) without blue holes and two outflow crevasses in the Floodway Frontline Levee (Test A) would result in a Cairo crest stage of 61.1 ft (331.6 ft msl).
- b. Increasing the length of the three inflow crevasses to simulate a blue hole at each crevasse (Test A versus Test D) would lower the crest stage at Cairo 0.4 ft.

- c. Decreasing the length of each of the three inflow crevasses from 2400 to 1200 ft (Test A versus Test G) would raise the crest stage at Cairo 1.4 ft.
- d. Crevassing only the top 8 ft of each of the three 2400-ft-long inflow crevasses (Test A versus Test H) would raise the crest stage at Cairo 1.5 ft.
- e. Crevassing the full length of the three inflow crevasses at one time rather than sequentially (Test D versus Test J) would have no effect on the crest stage at Cairo.
- f. Operating only two inflow crevasses (Nos. 1 and 2) would raise Cairo crest stages about 1.0 ft with 2400-ft-long crevasses (Test A versus Test B) and about 0.8 ft with 2400-ft-long crevasses increased in length to simulate blue holes (Test D versus Test E).
- g. Operating only one inflow crevasse (No. 1) would raise Cairo crest stages about 2.0 ft with both 2400-ft-long crevasses (Test A versus Test C) and with 2400-ft-long crevasses increased in length to simulate blue holes (Test D versus Test F).
- h. Crevassing only the top 8 ft of the levee would increase the total length of the three inflow crevasses about 83 percent (from about 9,500 to about 17,400 ft) to avoid raising the crest stages at Cairo (Test D versus Test I).
- i. Operating only outflow crevasse No. 1 instead of both outflow crevasses (Test D versus Test K) would raise Cairo stages 0.3 ft.



TABLE 1

## BIRDS POINT-NEW MADRID FLOODWAY FRONTLINE LEVEE GRADE

LEVEE STATION	GRADE	LEVEE STATION	GRADE
33/20 + 21	329.4	58/0	322.9
34/0	328.9	59/0	322.7
34/13 + 82	328.9	60/0	322.6
35/0	328.4	61/0	322.3
36/0	327.9	62/0	322.0
37/0	327.8	63/0	321.7
38/0	327.4	64/5 + 00	321.0
39/0	327.1	64/30 + 00	320.5
39/24 + 00	327.0	65/0	320.3
39/24 + 00	329.4	66/0	319.5
40/0	329.3	66/40 + 00	318.3
40/11 + 00	329.2	67/0	318.2
40/11 + 00	326.7	68/0	318.1
41/0	326.5	69/0	318.0
42/0	326.1	69/40 + 00	317.9
43/0	326.0	70/0	317.2
44/20 + 76	325.7	71/0	316.9
44/20 + 76	328.3	72/0	316.7
45/0	328.1	73/0	316.3
45/18 + 00	328.1	74/0	315.9
46/0	327.8	75/0	315.4
46/50 + 00	327.6	76/0	315.3
47/0	327.6	77/0	314.8
47/10 + 00	327.4	78/0	314.3
47/60 + 00	326.8	78/25 + 00	313.9
48/0	326.6	79/0	313.7
48/12 + 98	326.5	80/0	313.6
48/41 + 00	325.7	80/43 + 00	313.4
49/0	325.7	81/0	313.0
49/20	325.7	81/48 + 25	312.6
49/35	325.7	82/0 + 35	312.3
50/0	325.7	82/0 + 35	308.4
51/0	325.4	82/40 + 93	307.1
52/0	325.3	83/0	307.0
53/0	325.1	83/45 + 66	306.2
54/0	325.2	84/0	306.1
54/35 + 00	325.1	85/0	305.3
55/0	324.7	85/20 + 00	305.3
56/0	324.5	86/0	305.3
57/0	323.2	86/8 + 28	305.3

Upper Fuseplug Section

Lower Fuse-  
plug Section

TABLE 2

## TEST CONDITIONS

TEST	Birds Point-New Madrid Frontline Levee				Madrid Bend		Tiptonville-Obion		Booth Pt.	
	Inflow Crevasses		(1)	Time (2)	Outflow Crevasses		Time (4)	Mo Day Hr	Time (4)	Mo Day Hr
	Crevasse	Length			Crevasse	No.				
A	1,2,&3	2400		1-26-2400	1&2	1&2	1-29-0800	1-30-1000	2-3-0300	1-26-1200
B	1&2	2400		1-26-2400	1&2	1&2	1-29-0800	1-30-1800	2-3-0400	1-26-1200
C	1	2400		1-26-2400	1&2	1&2	1-30-2000	1-30-1800	2-3-0100	1-26-1200
D	1,2,&3	CTP (5)		1-26-2400	1&2	1&2	1-29-0400	1-30-2000	2-2-2400	1-26-1200
E	1&2	CTP (5)		1-26-2400	1&2	1&2	1-29-0400	1-30-0600	2-2-2000	1-26-1200
F	1	CTP (5)		1-26-2400	1&2	1&2	1-30-1200	1-30-0800	2-3-0500	1-26-1200
G	1,2,&3	1200		1-26-2400	1&2	1&2	1-30-0400	1-30-2400	2-3-0300	1-26-1200
H	1,2,&3	2400 (6)		1-26-2400	1&2	1&2	1-30-1200	1-30-2000	2-3-0400	1-26-1200
I	1,2,&3	CTP (7)		1-26-2400	1&2	1&2	1-29-0400	1-30-0800	2-3-0400	1-26-1200
J	1,2,&3	CTP (8)		1-26-2400	1&2	1&2	1-28-1800	1-30-0400	2-2-2100	1-26-1200
K	1,2,&3	CTP (5)		1-26-2400	2	2	1-29-0400	1-30-2000	2-2-2400	1-26-1200

## NOTE

- (1) Total length in prototype feet - Table 3 gives crevasse schedule.  
 (2) Time of initial crevasse - when Cairo stage reached 60 ft (330.5 ft msl).  
 (3) Time of initial crevasse - 12 hours after lower fuseplug was overtopped.  
 (4) Time of initial crevasse - 12 hours after levee was overtopped.  
 (5) Length - 2400 ft plus additional length to simulate effect of blue hole. This length was the same as that used in the Comprehensive Testing, MBM Report 29-1, dated November 1971. Inflow Crevasse No. 1, 3446 ft; Nos. 2 and 3, 2976 ft each.  
 (6) Crevassed only the top eight feet.  
 (7) Crevassed only the top eight feet but increased length to duplicate stages at Cairo for Test D. (Inflow Crevasse No. 1 - 5466 ft; Crevasses Nos. 2 and 3 - 5952 ft each.)  
 (8) Same as in Comprehensive Testing Program (Note 5) but full crevasse was made at one time.

TABLE 3  
LEVEE CREVASSE SCHEDULE

TEST NO.	Inflow Crevasse 1			Inflow Crevasse 2&3			Outflow Crevasse 1&2		
	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)
I Birds Point-New Madrid Frontline Levee									
A,B(3), C(4) and H(5)	0	0	244	0	0	453	0	0	562
	0	6	390	0	12	1089	1	0	1350
	0	13	953	1	0	1407	2	0	1744
	1	1	1213	2	0	1768	3	0	2192
	1	13	1450	3	0	2039	4	0	2528
	2	1	1645	4	0	2220	5	0	2752
	2	13	1840	5	0	2310	6	0	2864
	3	1	1929	12	0	2400	7	0	2976
	3	13	2002						
	4	13	2075						
	5	13	2173						
	6	13	2254						
	9	13	2319						
	16	13	2400						
D,E(3),F(4) and K(6)	0	0	360	0	0	562	0	0	562
	0	6	576	0	12	1350	1	0	1350
	0	13	1406	1	0	1744	2	0	1744
	1	1	1788	2	0	2192	3	0	2192
	1	13	2138	3	0	2528	4	0	2528
	2	1	2426	4	0	2752	5	0	2752
	2	13	2714	5	0	2864	6	0	2864
	3	1	2846	12	0	2976	12	0	2976
	3	13	2954						
	4	13	3062						
	5	13	3206						
	6	13	3326						
	9	13	3446						
	16	13	3542						
J	0	0	3542	0	0	2976	0	0	2976
G	0	0	122	0	0	226	0	0	562
	0	6	195	0	12	544	1	0	1350
	0	13	477	1	0	703	2	0	1744
	1	1	606	2	0	884	3	0	2192
	1	13	725	3	0	1019	4	0	2528
	2	1	823	4	0	1109	5	0	2752
	2	13	920	5	0	1154	6	0	2864
	3	1	965	12	0	1200	12	0	2976

(Continued)



TABLE 3 (Continued)

TEST NO.	Inflow Crevasse I			Inflow Crevasse 2&3			Outflow Crevasse		
	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)
G(Cont.)	3	13	1001						
	4	13	1039						
	5	13	1087						
	6	13	1127						
	9	13	1159						
	16	13	1200						
I(5)	0	0	720	0	0	1124	0	0	562
	0	6	1152	0	12	2700	1	0	1350
	0	13	2812	1	0	3488	2	0	1744
	0	18	3576	1	4	4384	3	0	2192
	1	1	4276	1	8	5056	4	0	2528
	1	6	4852	1	12	5504	5	0	2752
	1	12	5428	1	16	5728	6	0	2864
	1	16	5466	1	20	5952	12	0	2976
II Madrid Bend									
A-K	0	0	500	0	0	500			
	1	0	1000	1	0	750			
	2	0	1500	2	0	1000			
	3	0	1875						
	4	0	2250						
	5	0	2625						
	6	0	3000						
III Tiptonville-Obion									
	0	0	360						
	0	6	576						
	0	13	1406						
	1	1	1788						
	1	13	2138						
	2	1	2426						
	2	13	2714						
	3	1	2846						
	3	13	2954						
	4	13	3062						
	5	13	3206						
	6	13	3326						
	9	13	3446						
	16	13	3542						

TABLE 3 (Concluded)

TEST NO.	<u>Inflow Crevasse I</u>			<u>Inflow Crevasse 2&amp;3</u>			<u>Outflow Crevasse</u>		
	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)	Day	Hr(1)	Length(2)

IV Booth Point

0 0 1700

## NOTE:

- (1) Time after initial crevasse. Table 2 gives time of initial crevasse.
- (2) Total length of crevasse in prototype feet.
- (3) Inflow crevasse 3 not crevassed.
- (4) Inflow crevasses 2 and 3 not crevassed.
- (5) Only top 8 ft of levee crevassed for the three inflow crevasses.
- (6) Outflow crevasse 1 not crevassed.

TABLE 4  
CREST HEAD DIFFERENTIAL AT CREVASSES

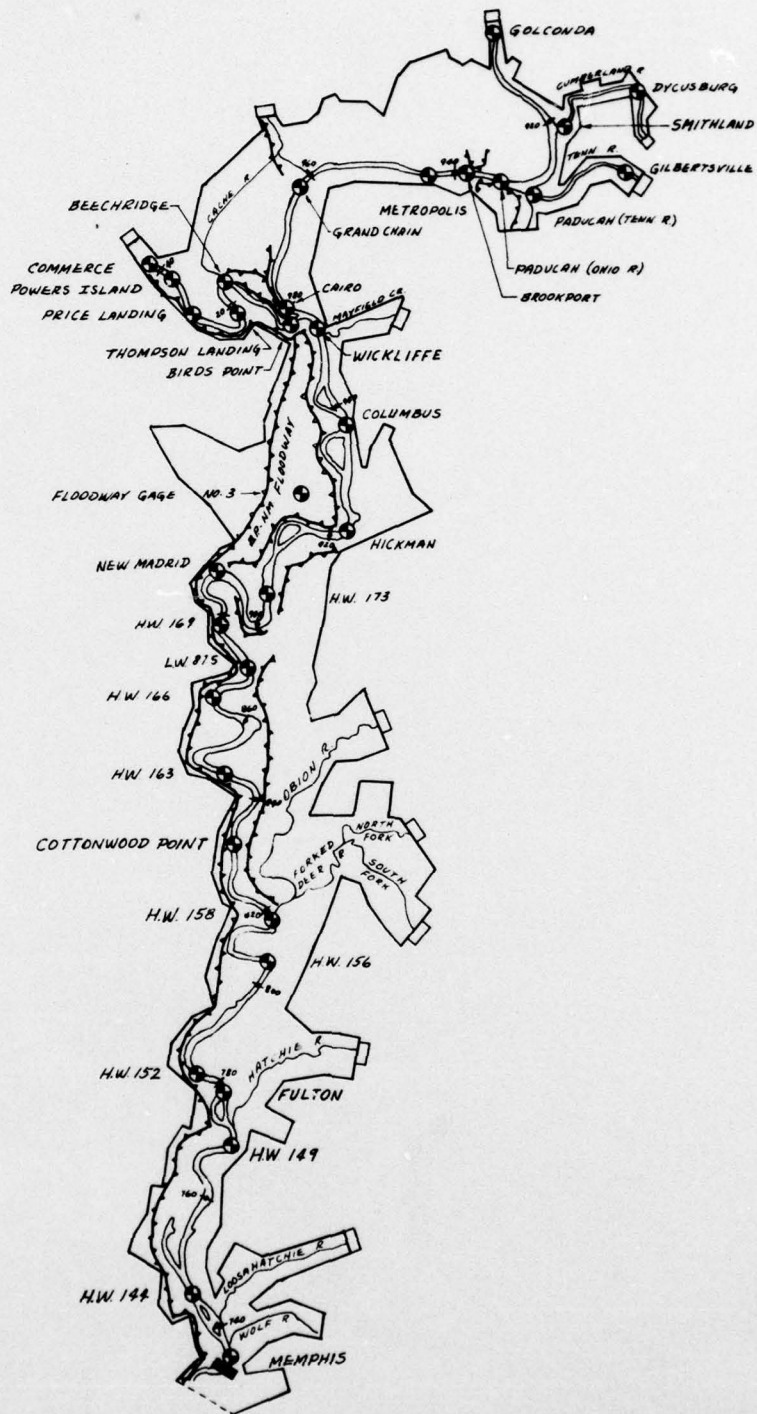
TEST	Birds Point-New Madrid Frontline Levee					
	Inflow Crevasse			Outflow Crevasse		
	1	2	3	1	2	
A	1.0	1.5	1.1	0.5	0.1	
B	1.7	1.7	--	0.9	0.2	
C	2.1	--	--	1.0	0.3	
D	0.5	0.8	0.7	0.3	0.4	
E	1.8	1.3	--	0.5	0.3	
F	--	--	--	--	--	
G	5.3	4.5	3.6	0.3	0.2	
H	3.6	4.5	3.9	0.3	0.2	
I	2.0	1.7	1.8	0.3	0.2	
J	0.5	0.8	0.7	0.3	0.4	
K	0.8	0.7	0.7	--	0.2	

NOTE: Head differential in prototype feet.



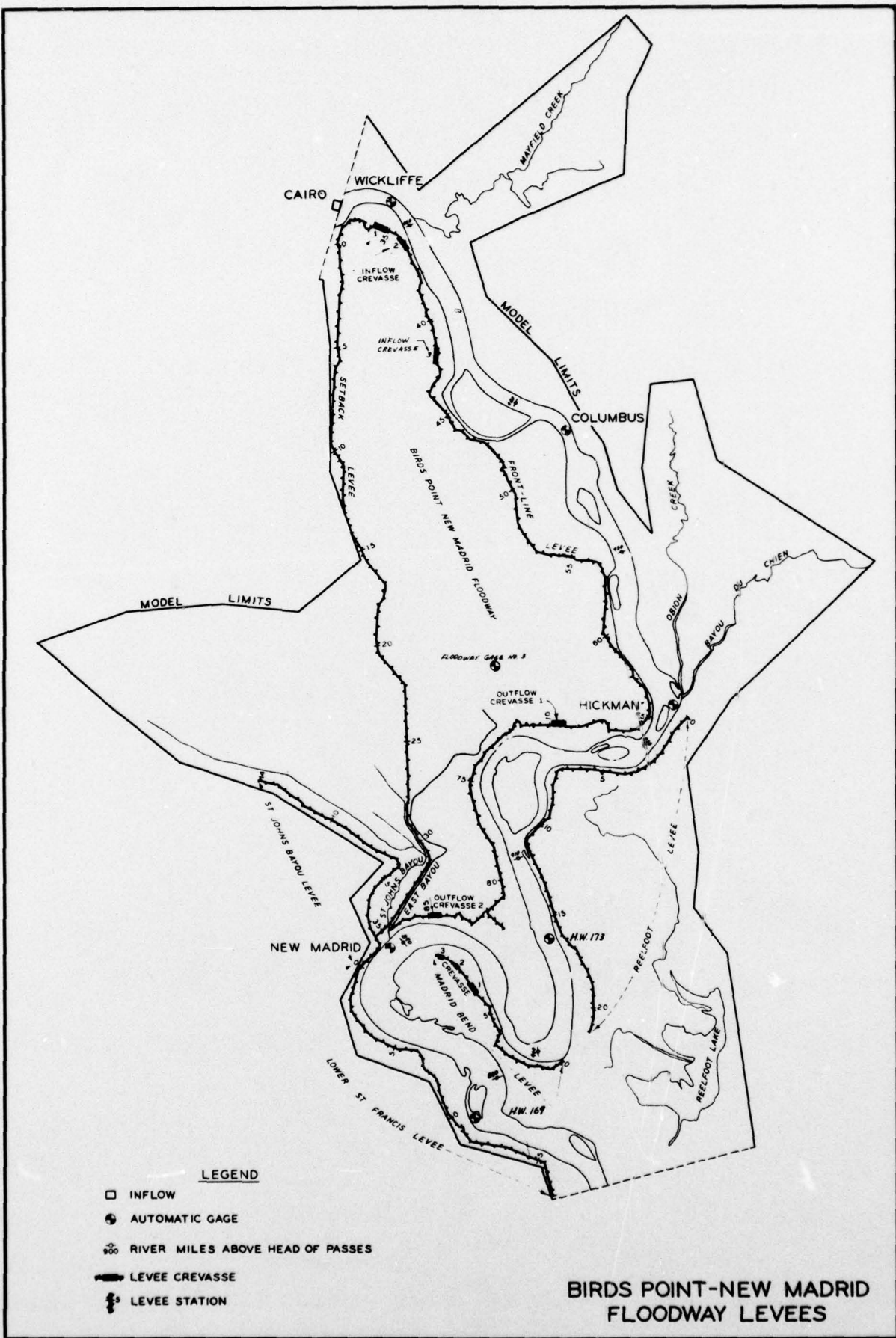
TABLE 5  
CREST WATER-SURFACE ELEVATIONS

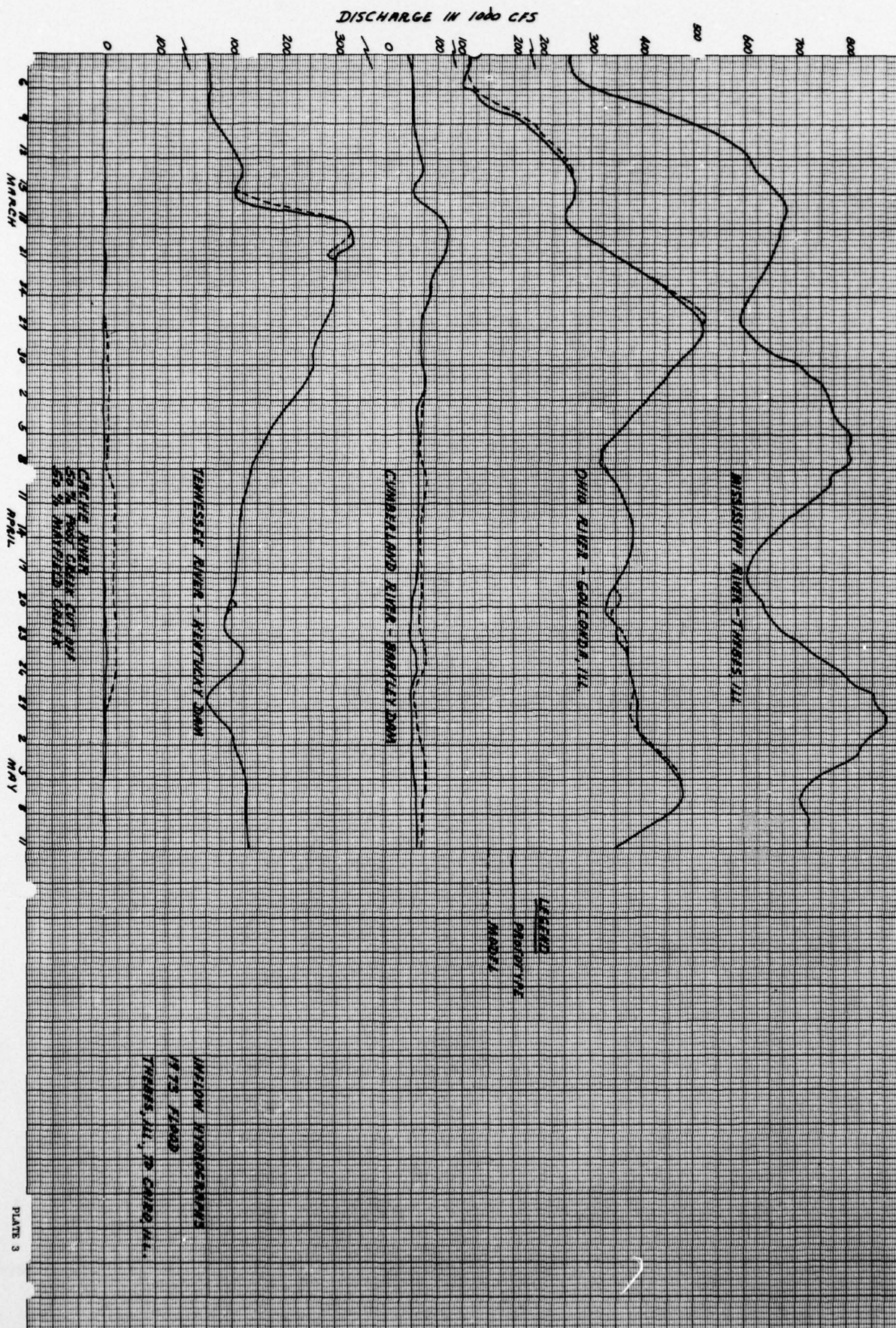
GAGE	TEST										
	A	B	C	D	E	F	G	H	I	J	K
I Miss. River											
Commerce	335.0	335.5	336.4	334.6	335.0	336.0	335.8	335.8	334.8	334.6	334.8
Powers Island	333.5	334.1	334.8	333.2	333.6	334.7	334.6	334.8	333.3	333.2	333.3
Price Ldg.	333.0	333.6	334.6	332.6	333.1	334.2	334.1	334.3	332.8	332.7	332.8
Thompson Ldg.	332.3	332.9	334.1	331.8	332.5	333.7	333.7	333.7	332.0	332.0	332.0
Beechridge	332.4	332.9	333.9	331.7	332.4	333.6	333.5	333.5	331.8	331.8	331.8
Birds Point	331.6	332.4	333.6	331.1	331.8	333.0	333.1	332.8	331.2	331.2	331.4
Wickliffe	329.8	330.5	331.8	329.2	330.0	331.4	331.2	331.2	331.4	329.5	331.5
Columbus	323.9	324.8	325.4	323.6	324.7	325.5	324.8	324.8	323.5	323.7	323.8
Hickman	318.9	319.6	320.2	318.6	319.5	320.2	319.8	319.8	318.8	318.8	319.4
H.W. 173	311.4	311.4	311.6	311.5	311.6	311.8	311.5	311.5	311.4	311.5	311.8
New Madrid	307.6	307.6	307.6	307.6	307.6	307.8	307.5	307.5	307.5	307.8	307.5
Mile 882.8	299.8	299.8	299.8	---	299.9	300.0	299.8	299.8	299.8	299.7	299.8
L.W. 87.5	295.9	295.9	295.9	295.8	295.9	295.9	295.8	295.8	296.0	295.8	296.0
H.W. 166	290.3	290.3	290.3	290.5	290.3	290.5	290.1	290.1	290.3	290.4	290.3
H.W. 163	285.0	285.0	285.0	285.0	284.9	285.1	285.0	285.0	285.0	285.1	285.0
II Ohio River											
Golconda	365.6	365.6	365.8	365.6	365.6	365.8	365.9	365.9	365.6	365.5	365.6
Dycusburg	356.7	356.7	356.9	356.7	356.7	356.9	356.9	356.9	356.6	356.7	356.6
Smithland	354.9	355.1	355.2	354.9	354.9	355.1	355.1	355.1	354.8	354.8	354.8
Gilbertsville	352.8	352.8	353.0	352.7	352.7	352.9	352.8	352.8	352.6	352.6	352.6
Paducah-Tenn R.	352.2	352.4	352.5	352.3	352.3	352.4	352.4	352.4	352.2	352.1	352.2
Paducah-Ohio R.	350.4	350.5	350.8	350.3	350.3	350.6	351.7	351.7	351.5	350.2	351.5
Brookport	348.1	348.4	348.5	348.3	348.4	348.7	348.5	348.5	348.2	348.0	348.2
Metropolis	344.4	344.6	344.9	344.2	344.3	345.0	344.7	344.7	344.2	344.2	344.2
Grand Chain	339.2	339.6	340.3	339.1	339.5	340.4	340.0	340.0	339.1	339.0	339.1
Cairo	332.0	333.0	334.0	331.6	332.4	333.6	333.4	333.5	331.8	331.6	331.9



**LOCATION MAP**  
MISSISSIPPI RIVER  
THEBAS TO MEMPHIS

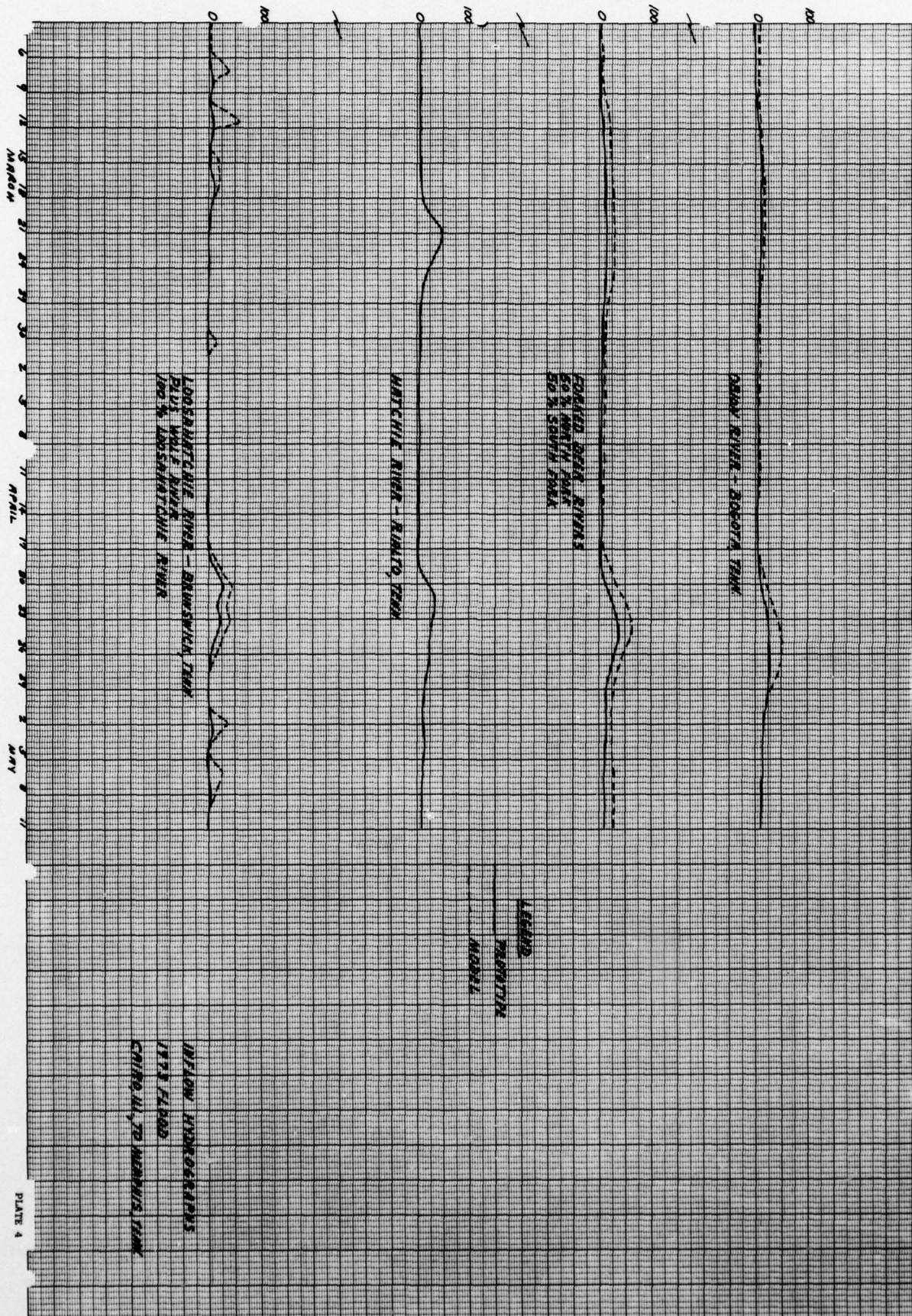




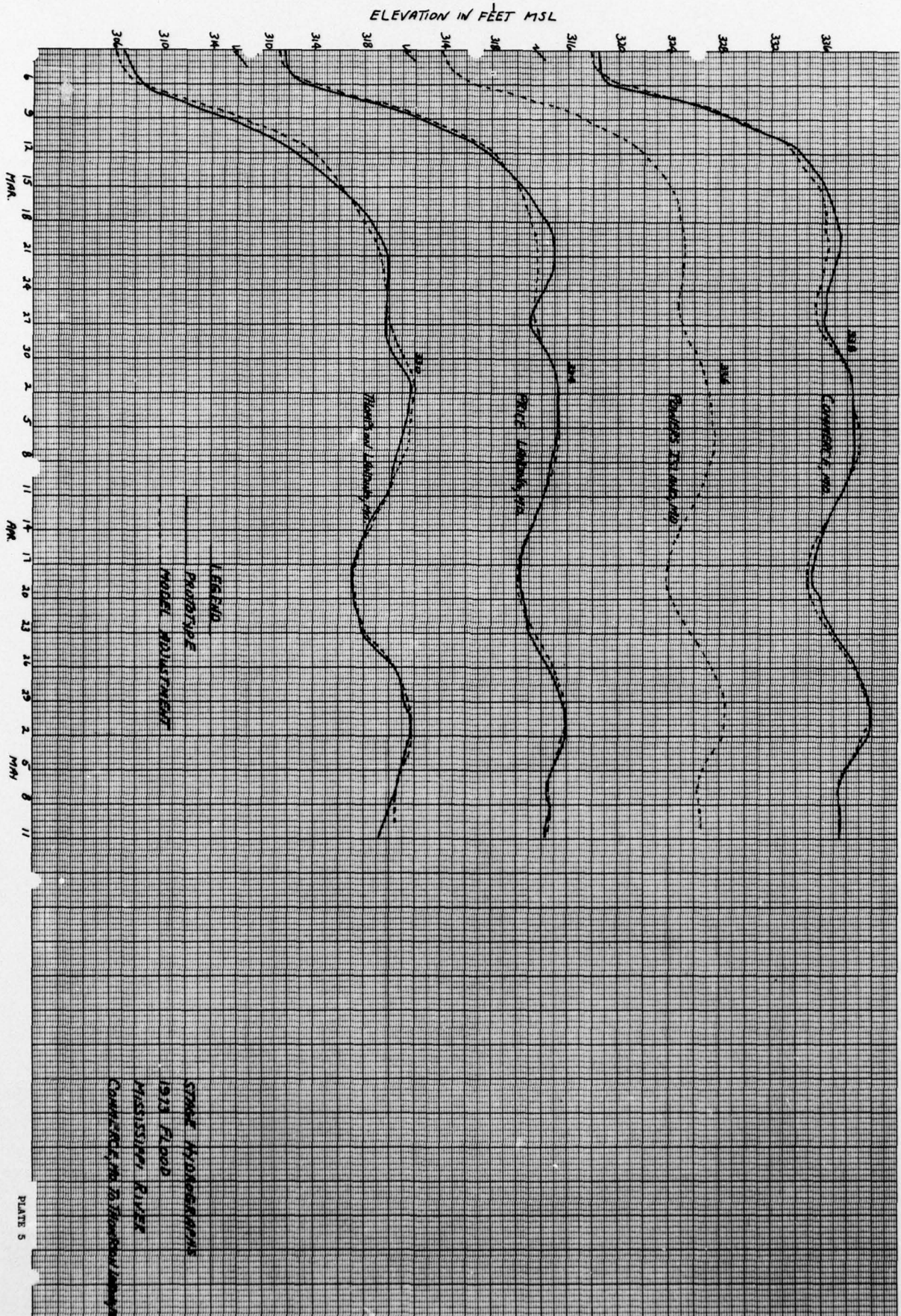




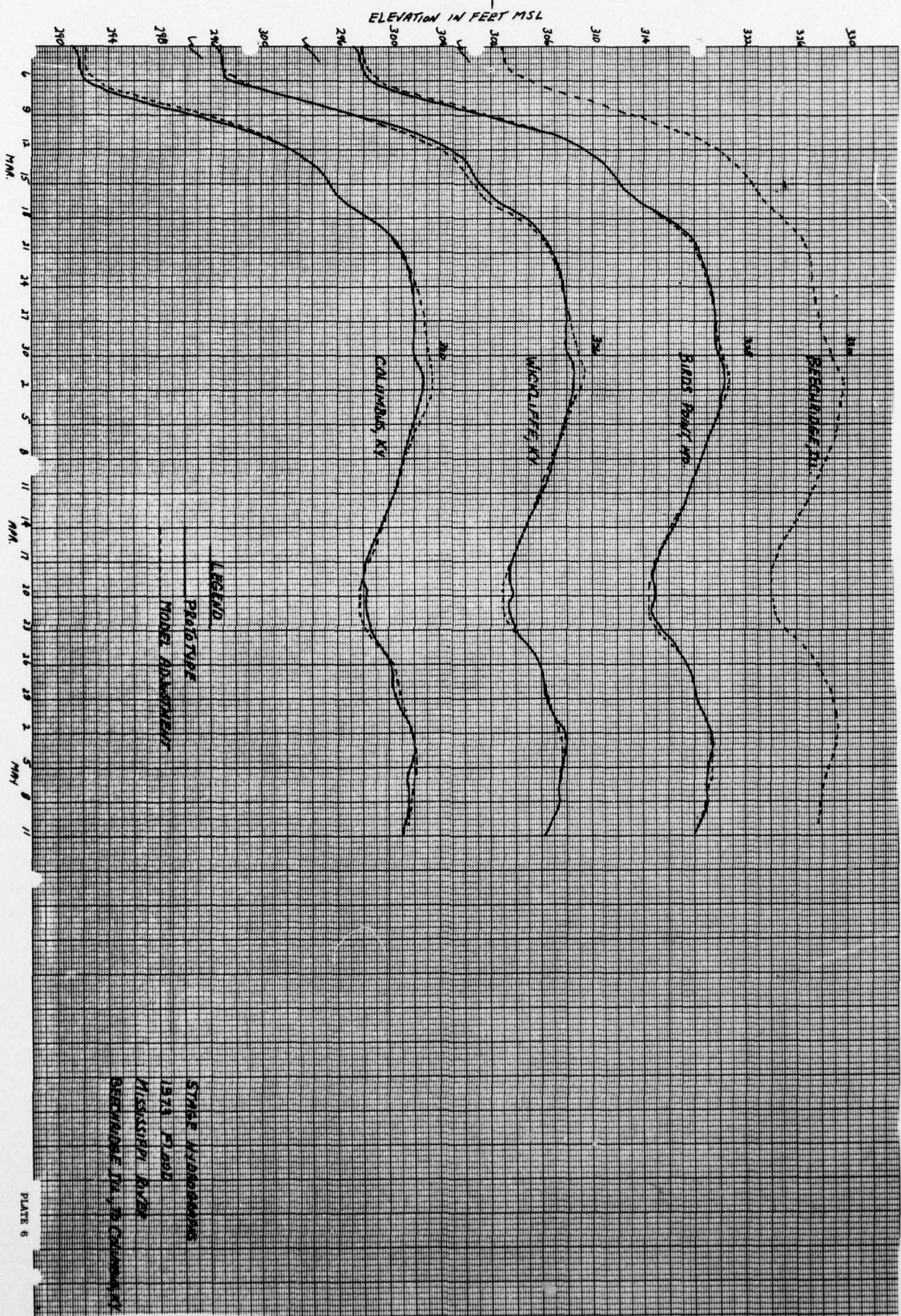
DISCHARGE IN 1000 CFS



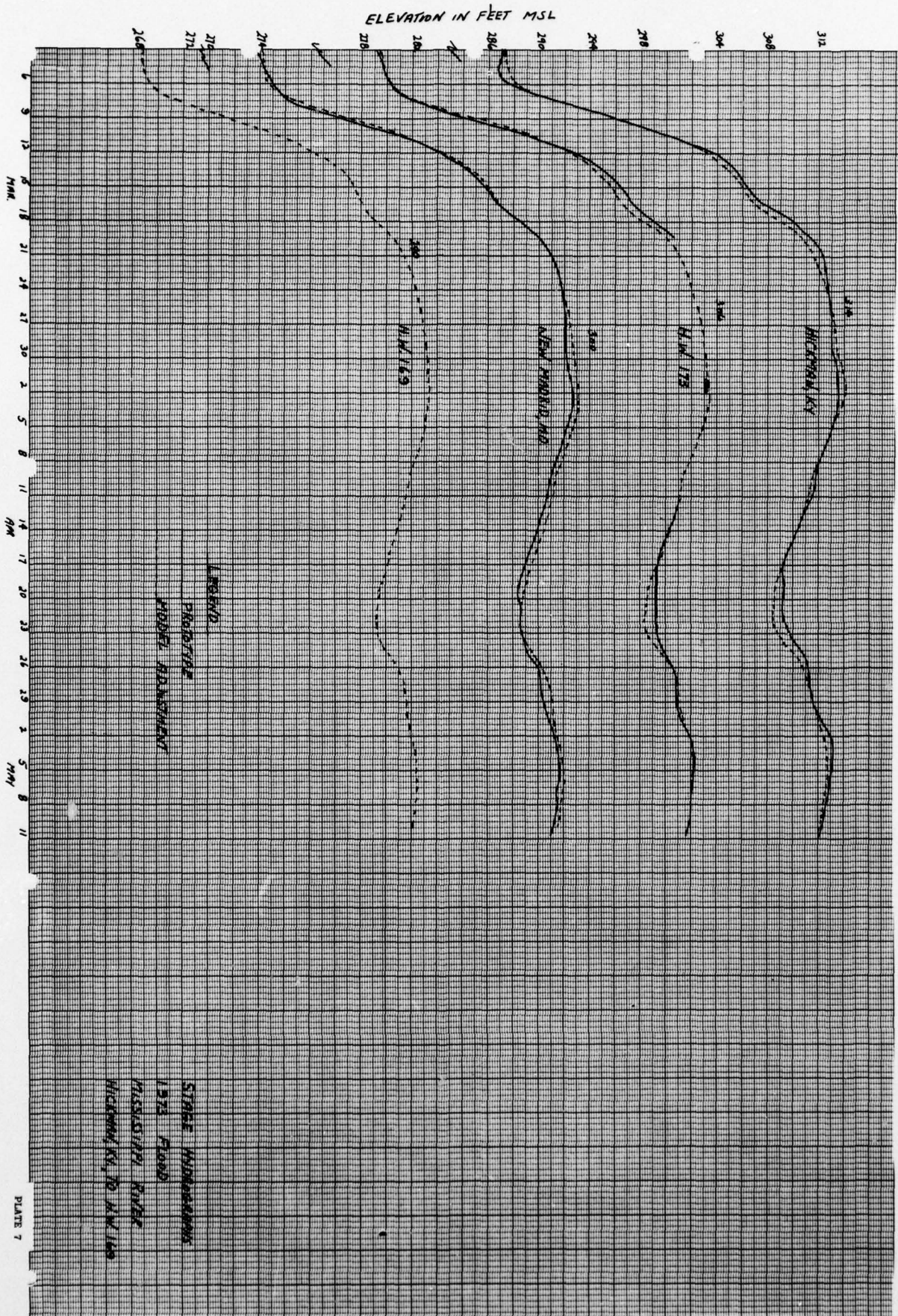




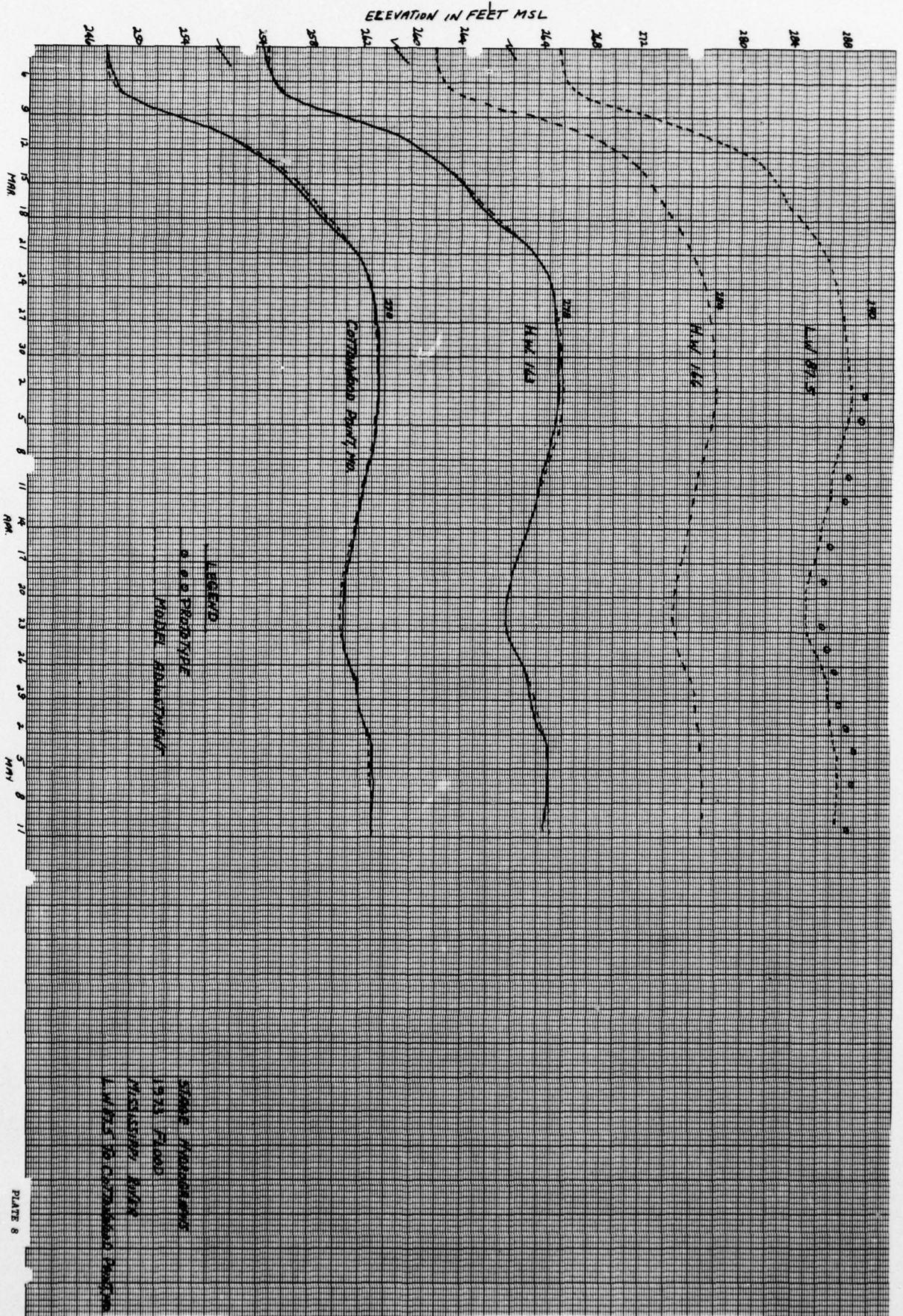




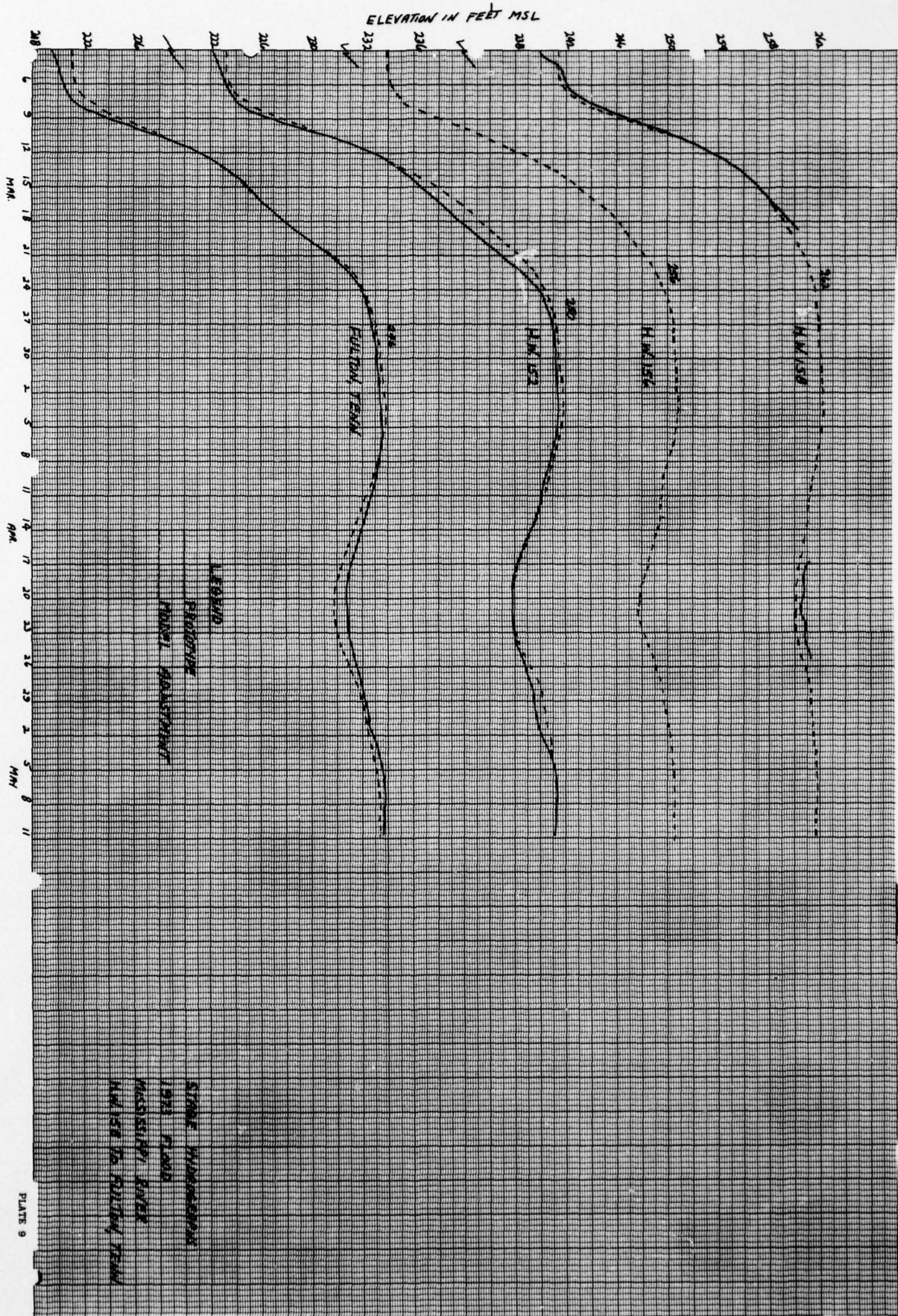




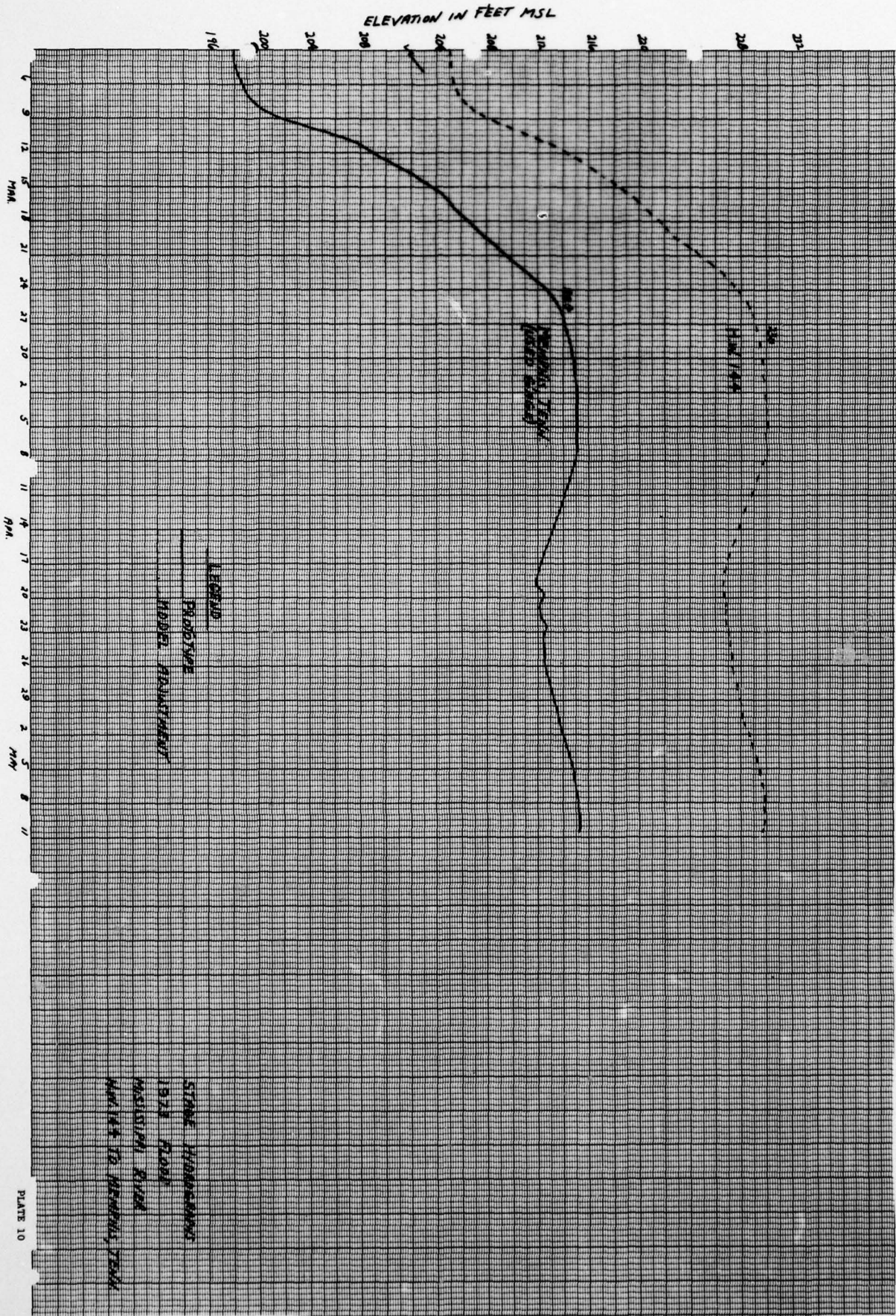




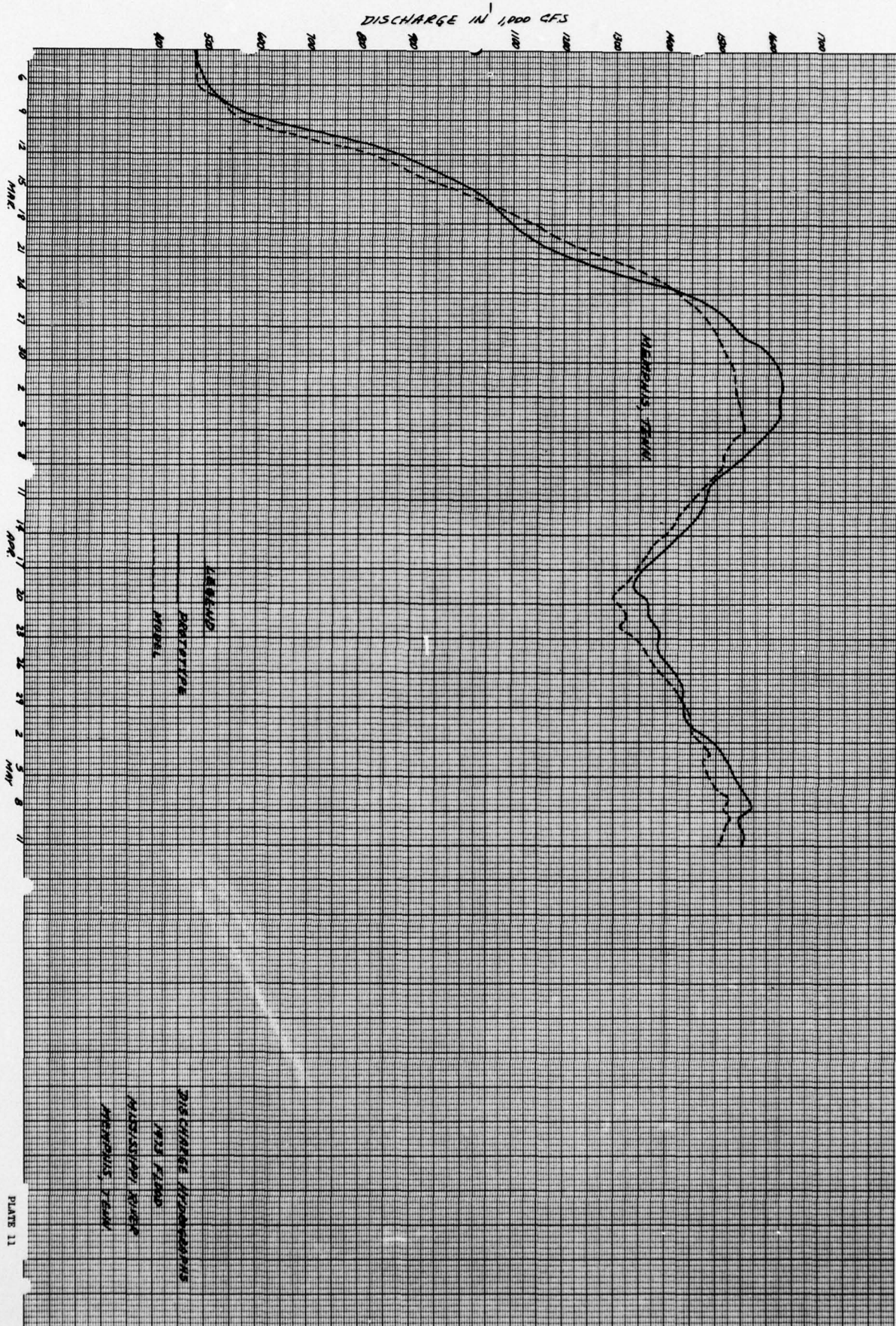




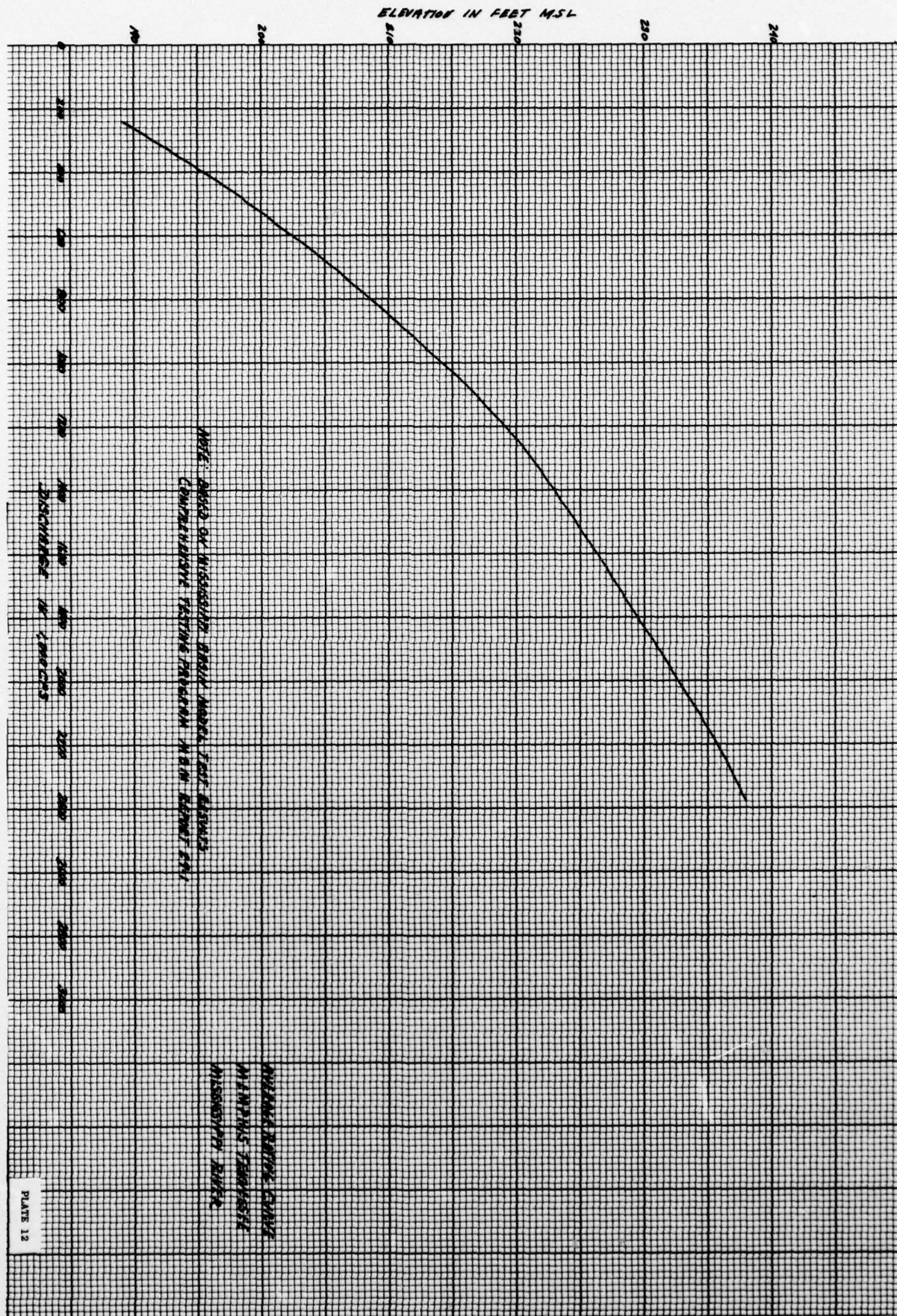






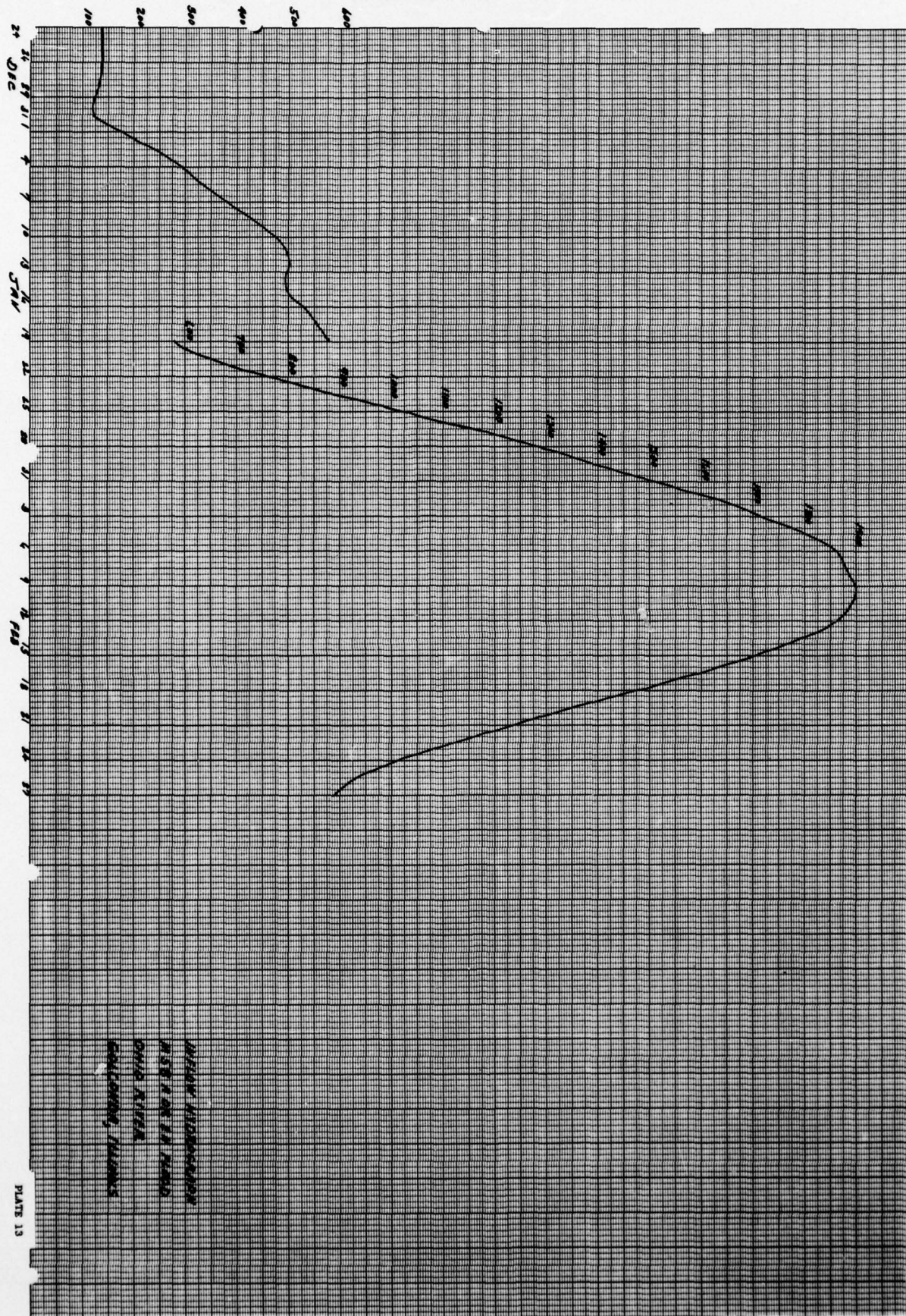






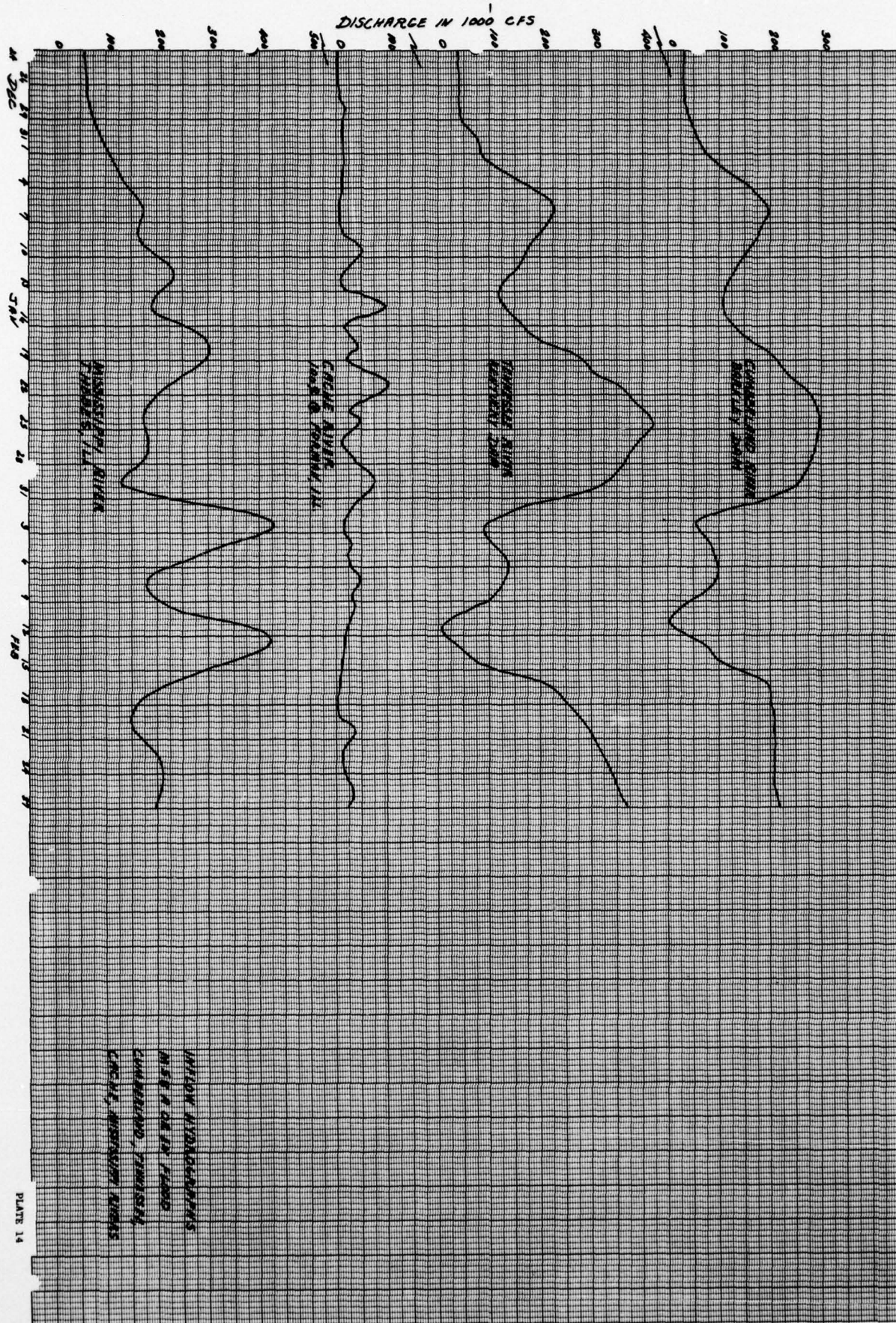


DISCHARGE IN 1000 CFS



WILLIAM H. HARRISON  
 H. B. K. & S. H. HARRISON  
 CIVIL ENGINEERS  
 BOSTON, MASS.







Four hand-drawn cross-sections of the Earth's crust and upper mantle, labeled 1, 2, 3, and 4. Each section shows a profile line with a shaded area representing the crust and a dashed line representing the upper mantle. Section 1 is labeled 'SOUTHERN RIVER, SOUTH TEXAS'. Section 2 is labeled 'HATCH, NEW MEXICO'. Section 3 is labeled 'HATCH, NEW MEXICO'. Section 4 is labeled 'LOOMINGTONE AND WINF RIVERS, NEW YORK, NEW YORK'. The vertical axis is labeled 'ft' and 'm'.

100% BLENDED AND 100% BLENDED  
100% BLENDED, 100% BLENDED

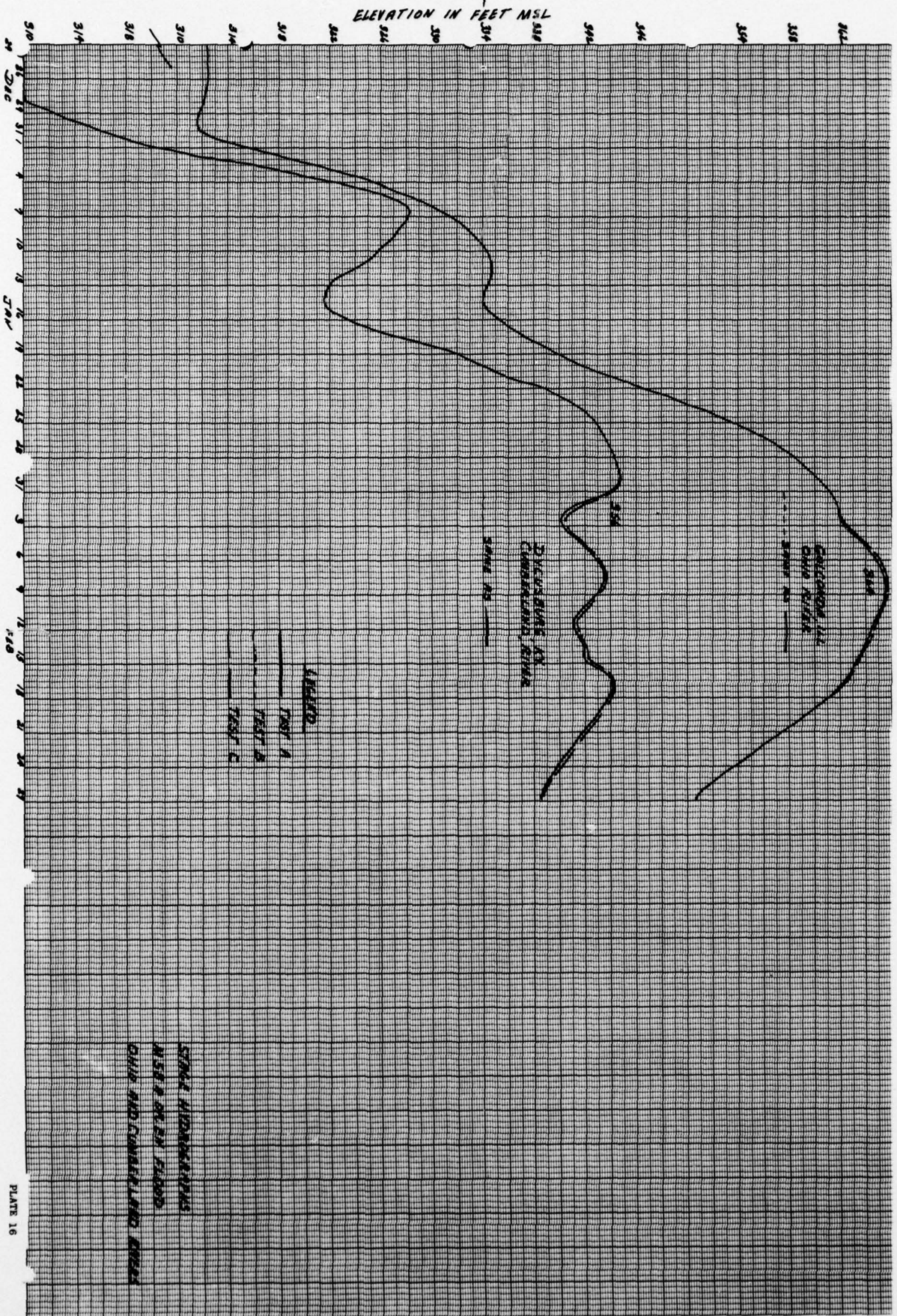
WESTERN UNION  
RADIO TELEPHONE

THE UNIVERSITY OF CHICAGO

**THE**

WISDOM OF DOBBS-REID PERS  
NIGHT ON THE STAND  
DONALD, FATHERED DEIRDRE, MOTHER  
LONGMARTINE AND MARY HARRIS

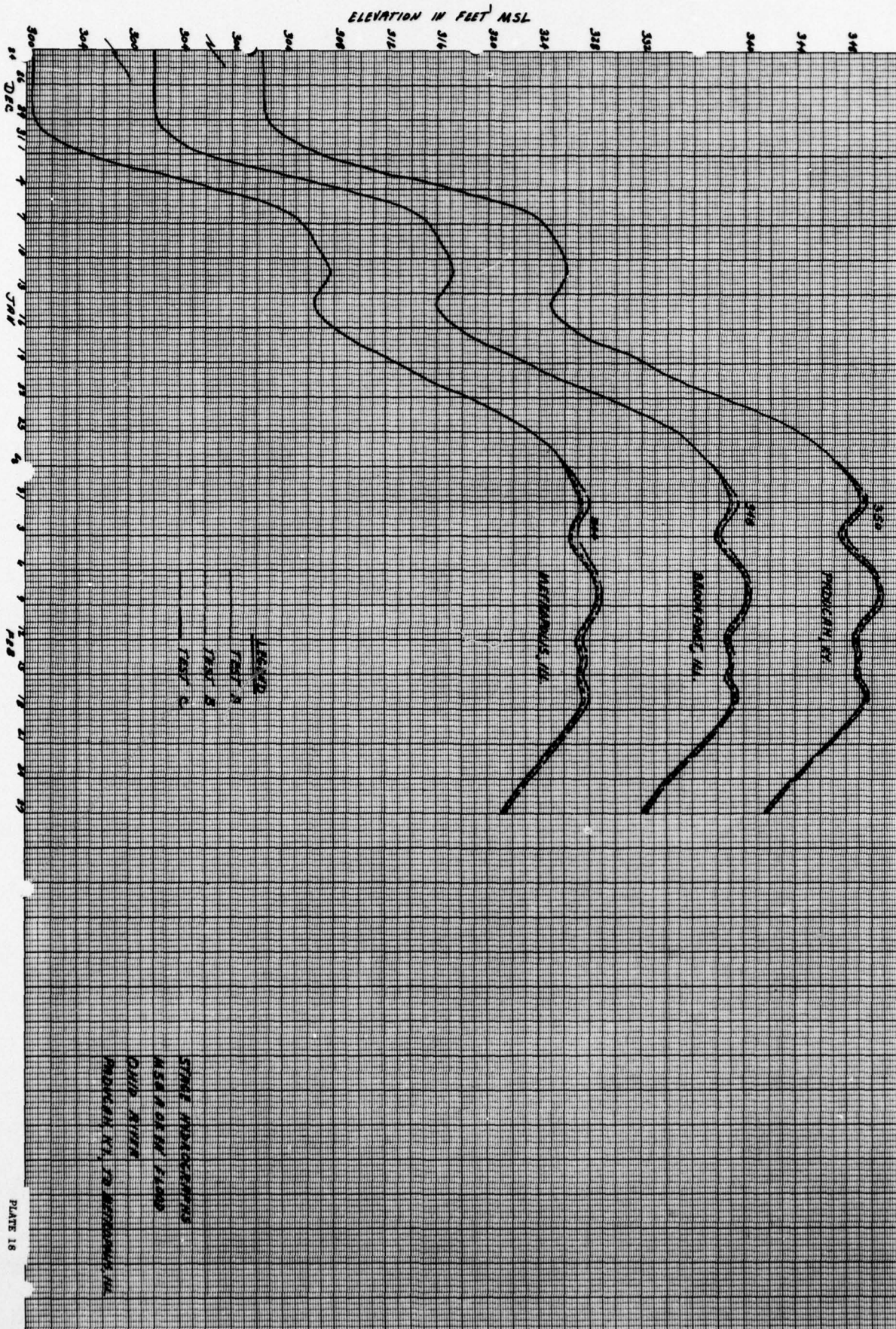




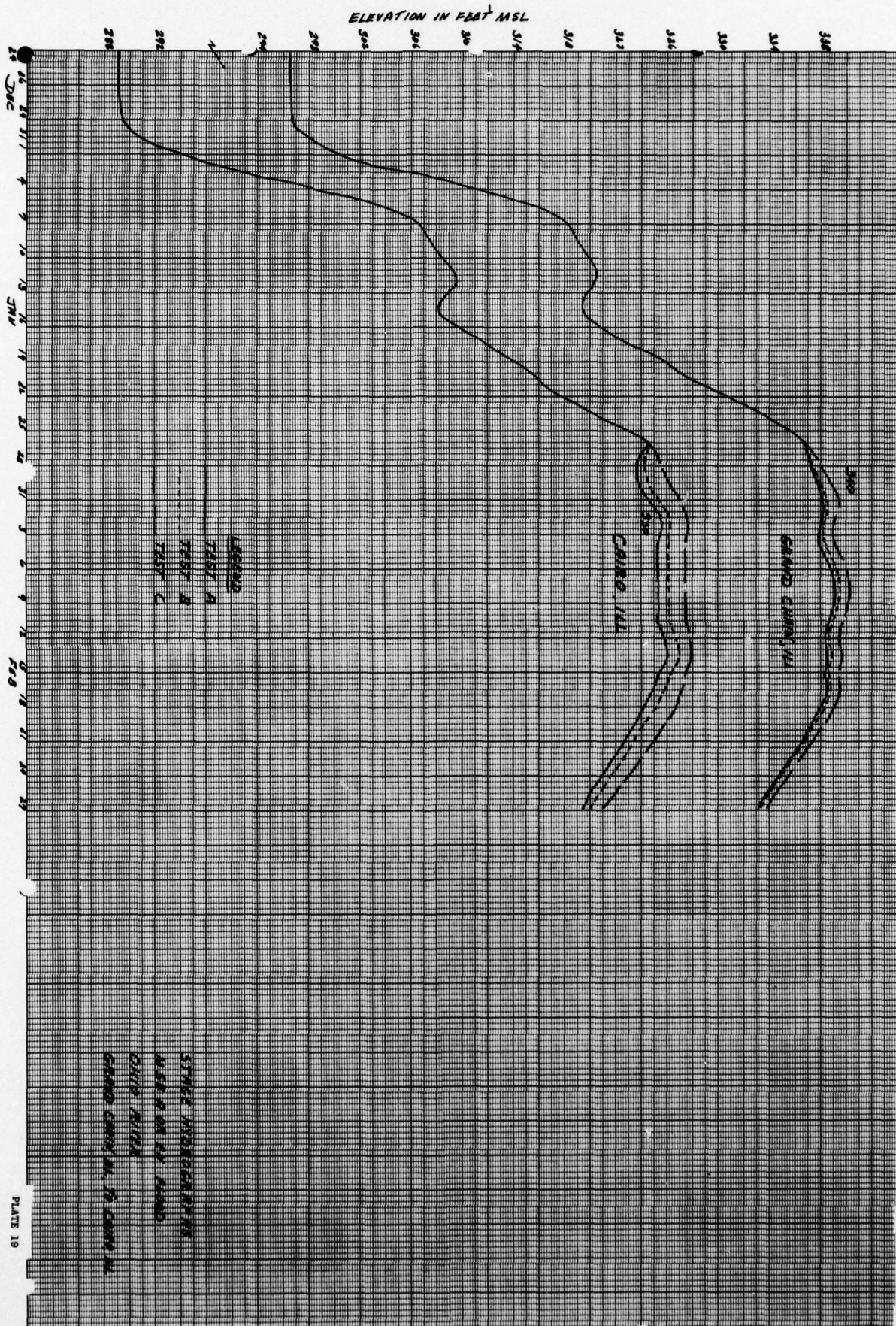




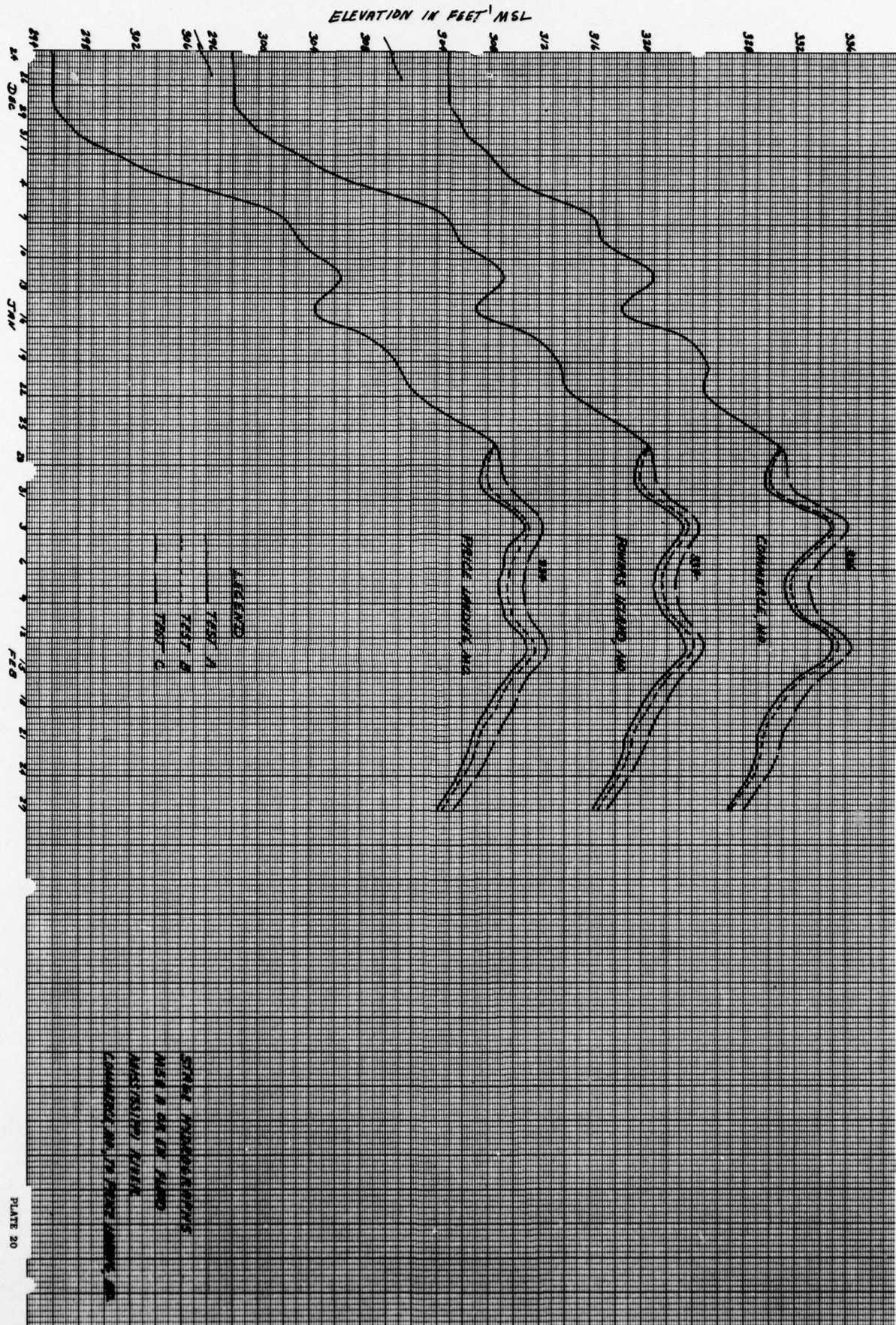




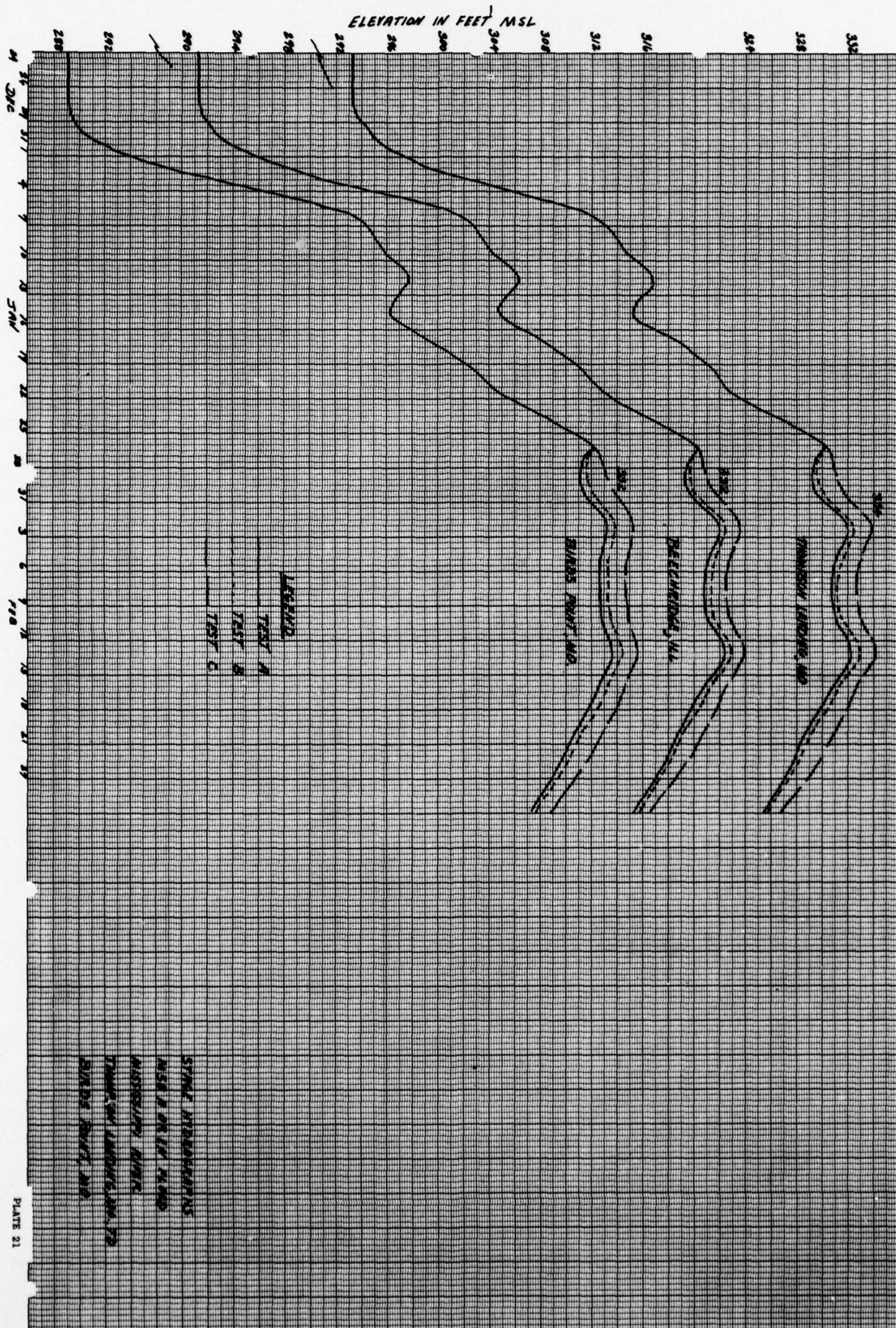








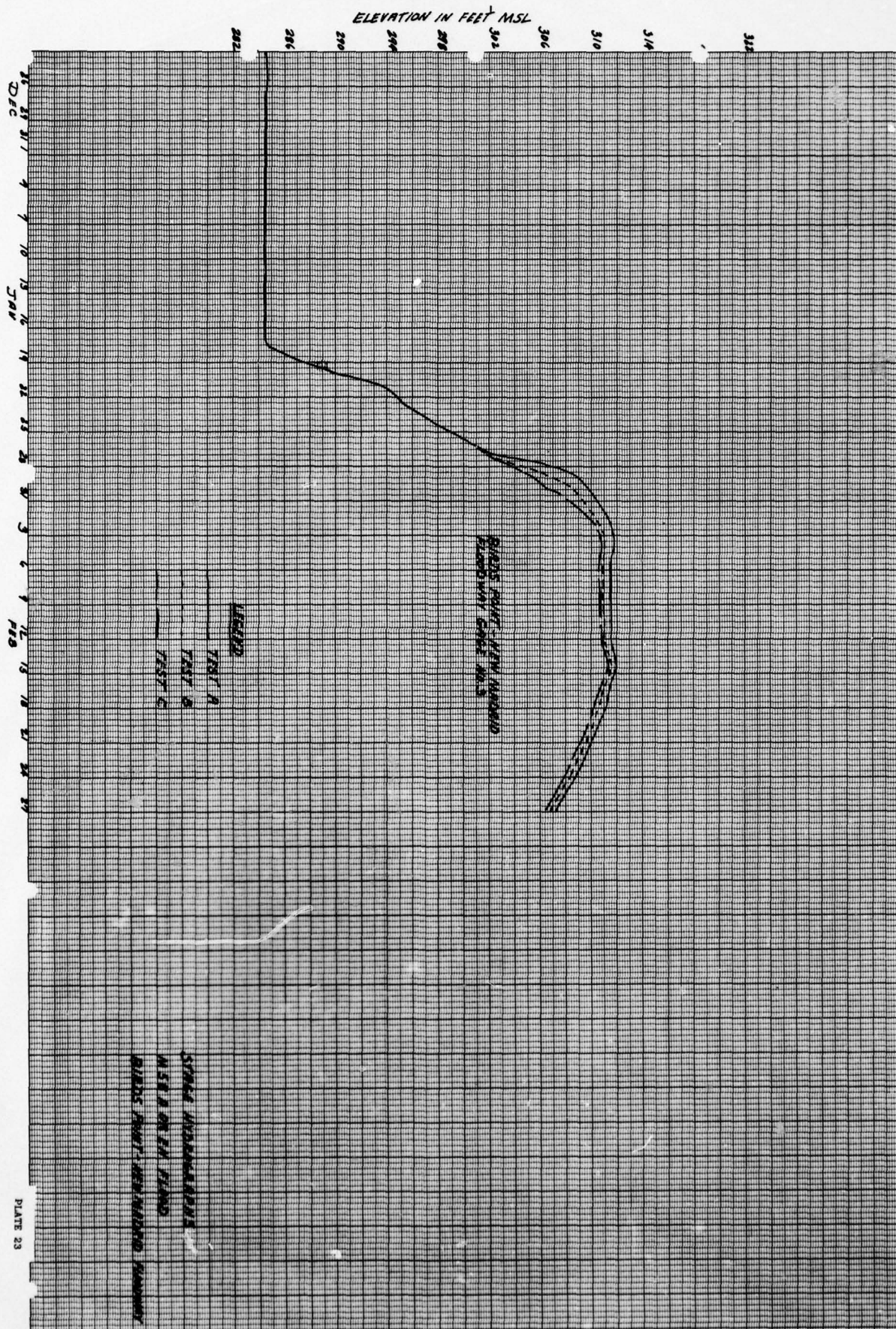








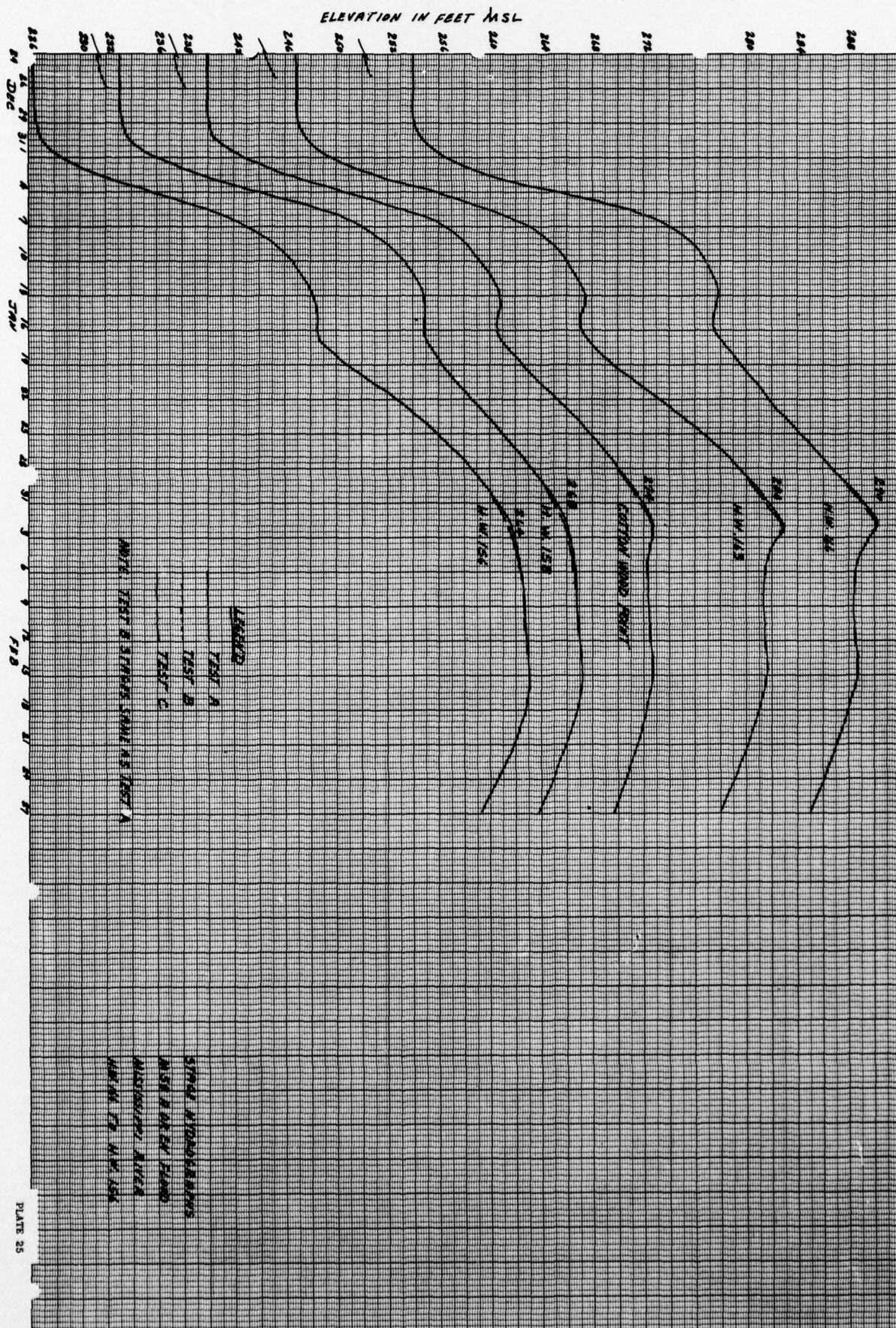




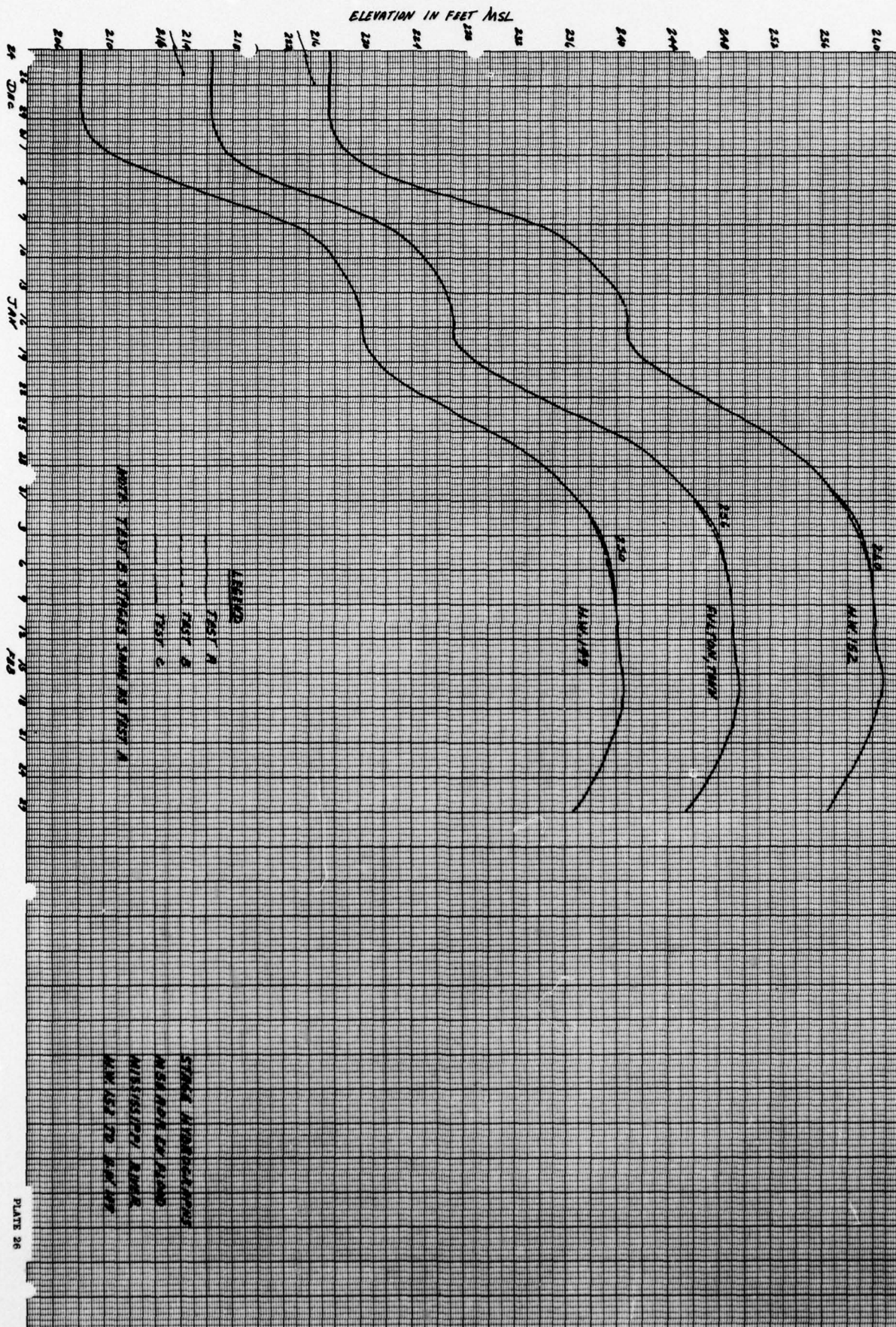








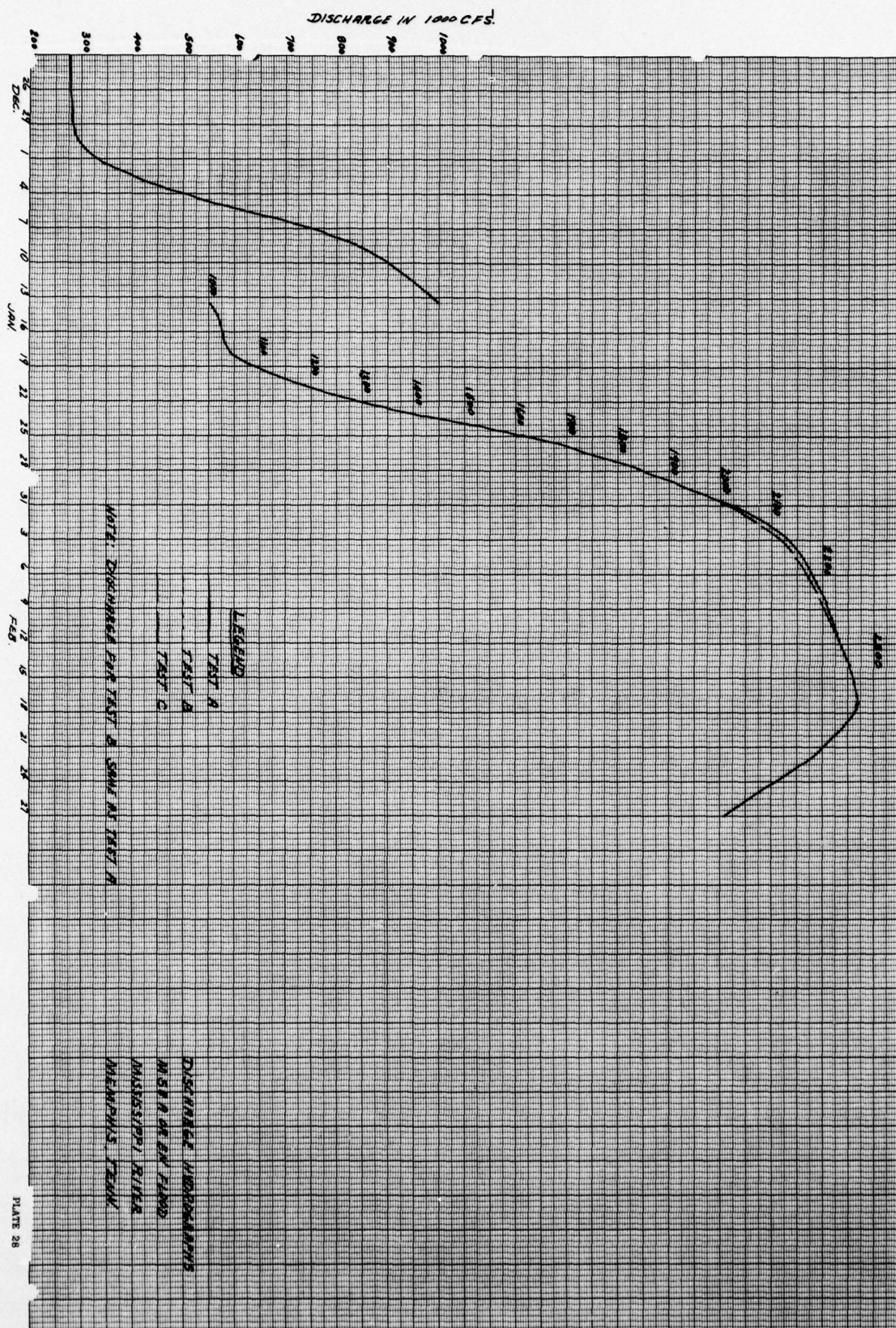




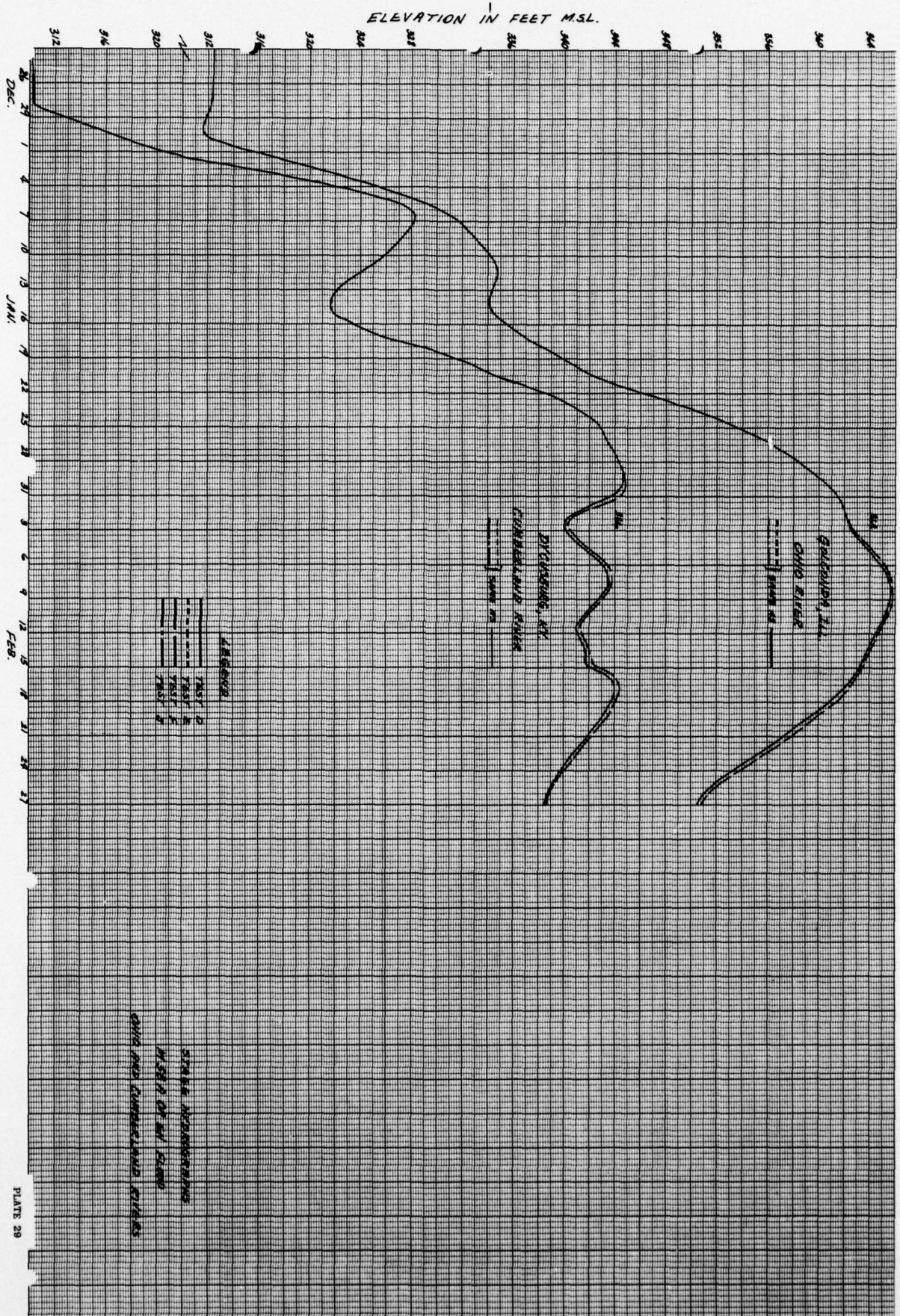




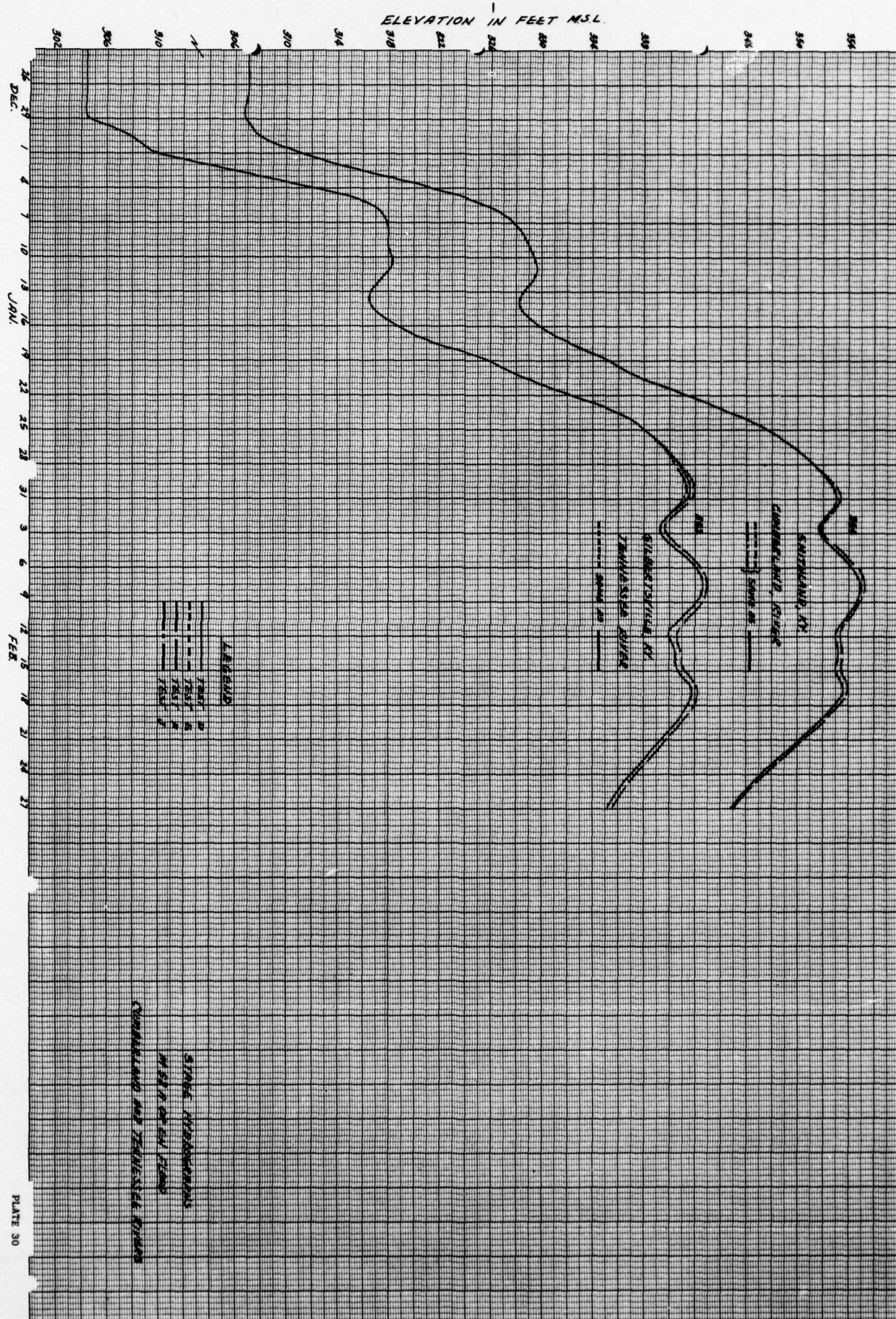








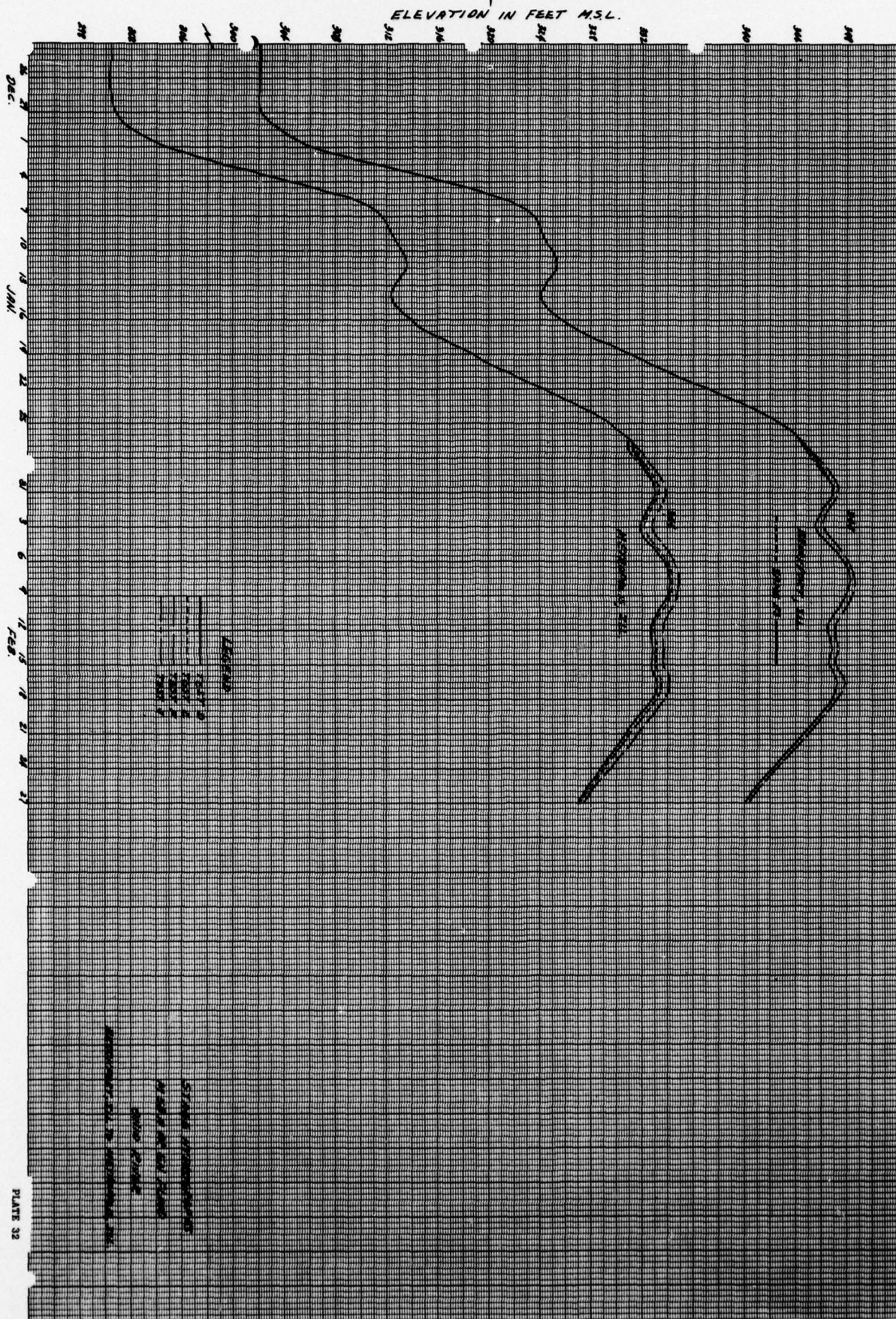






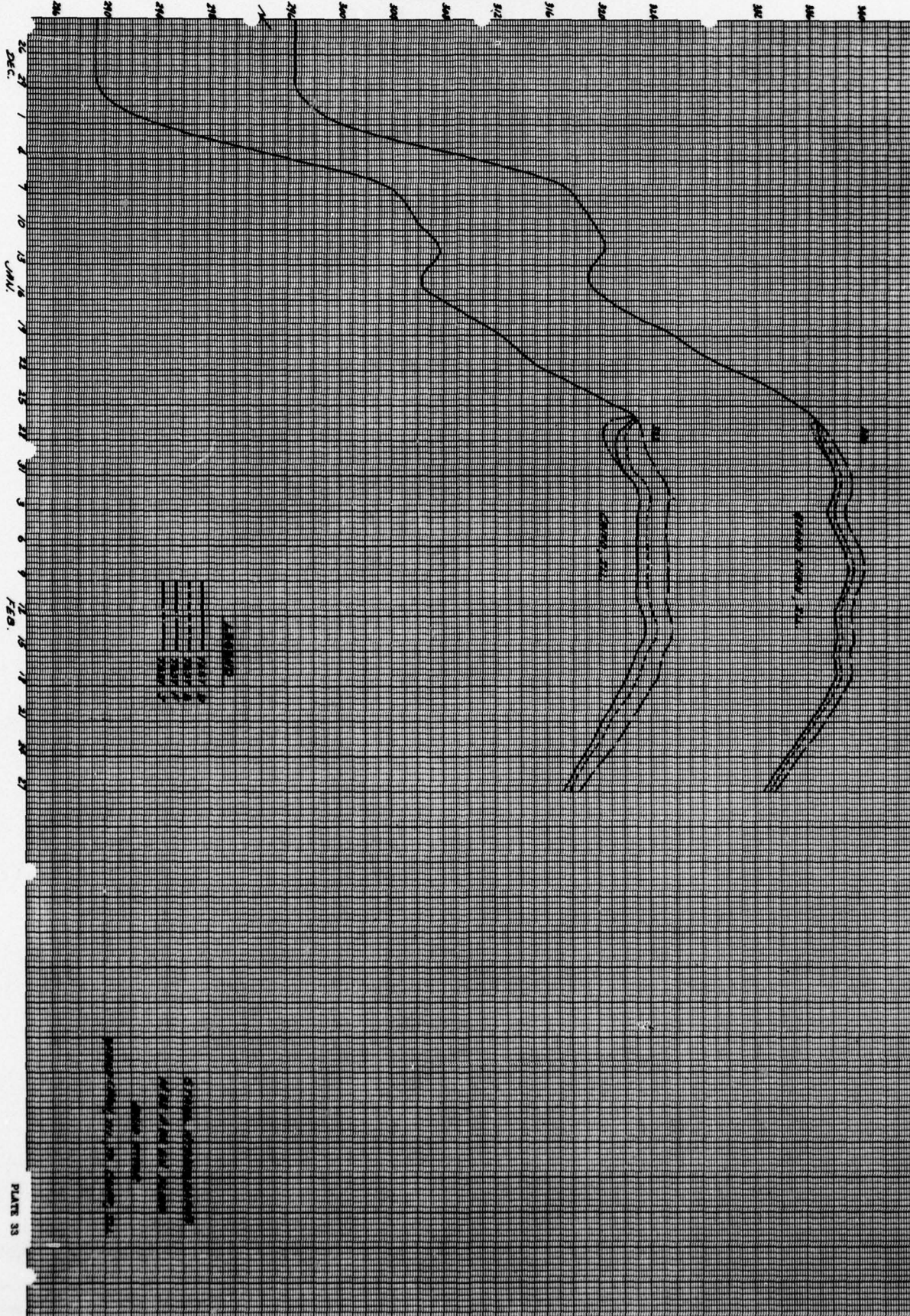








ELEVATION IN FEET MSL.

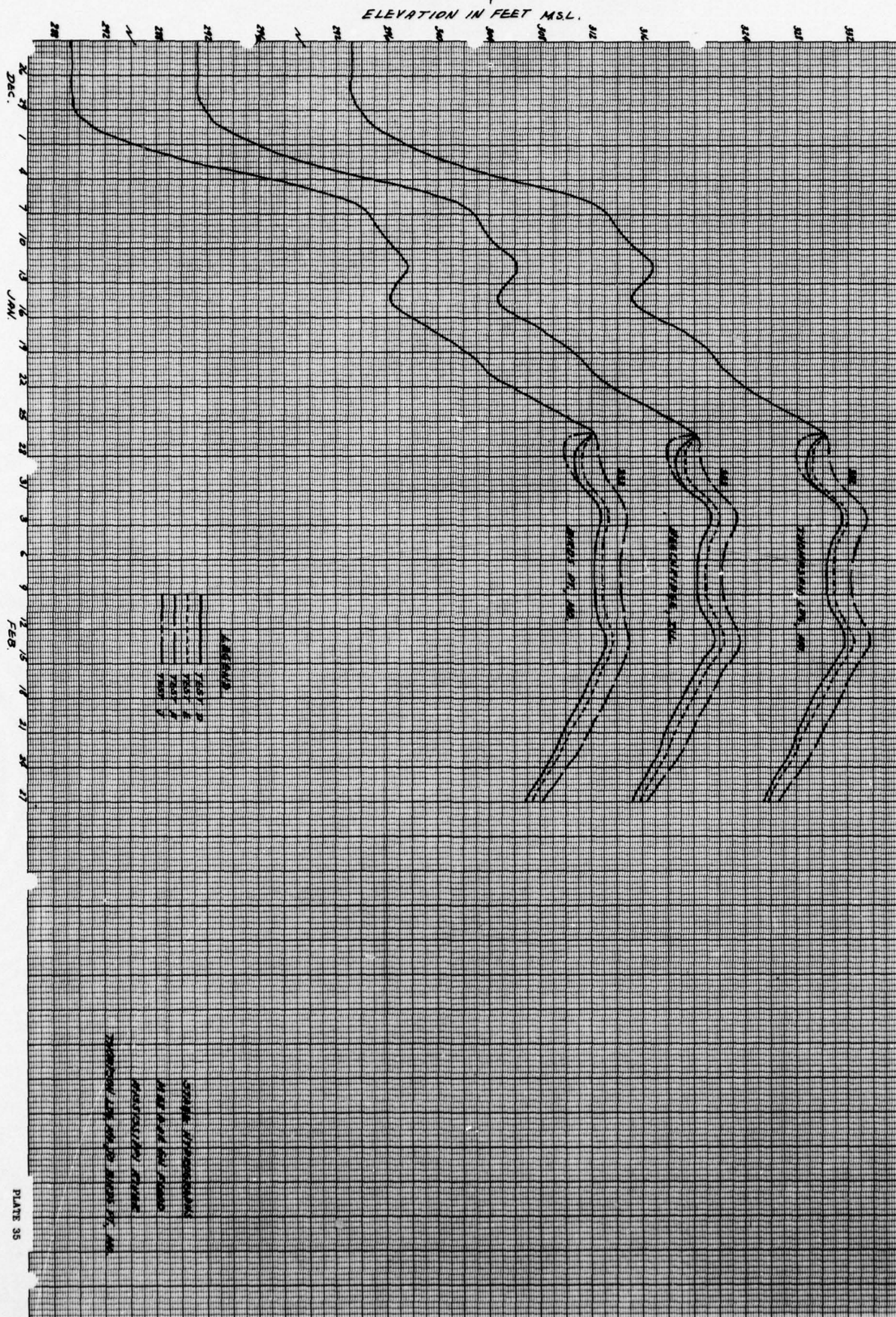




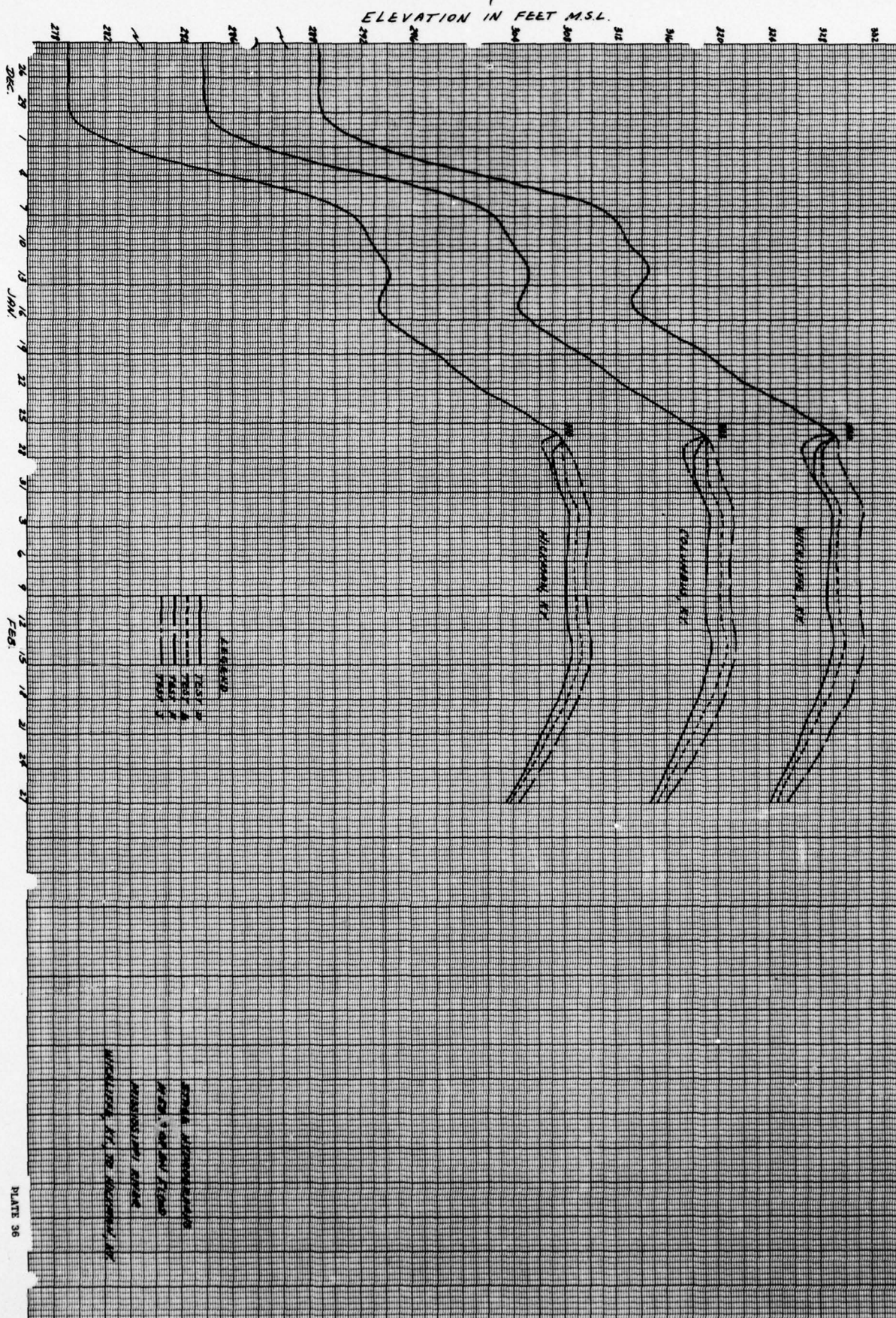
[illegible]

PLATE 34

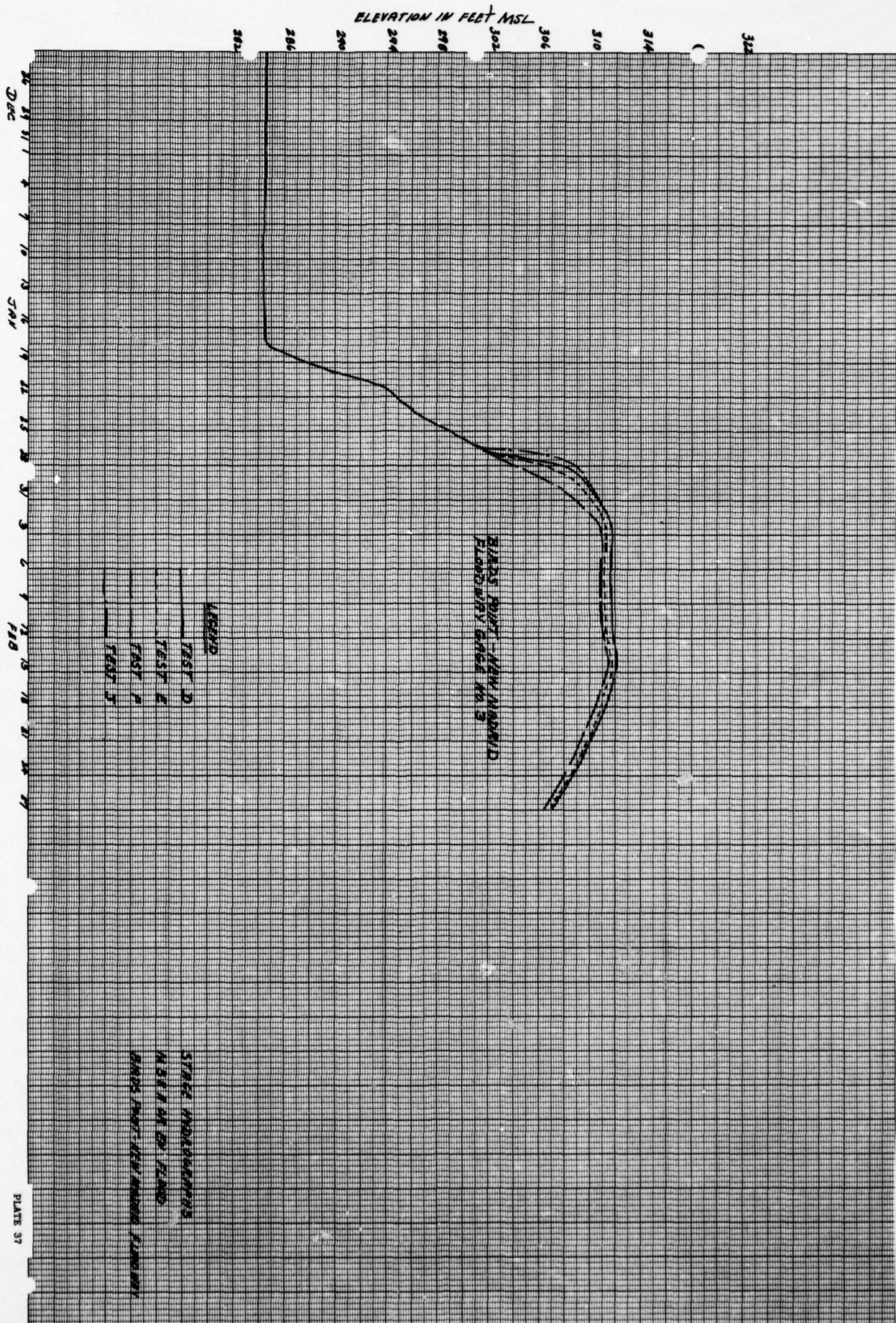




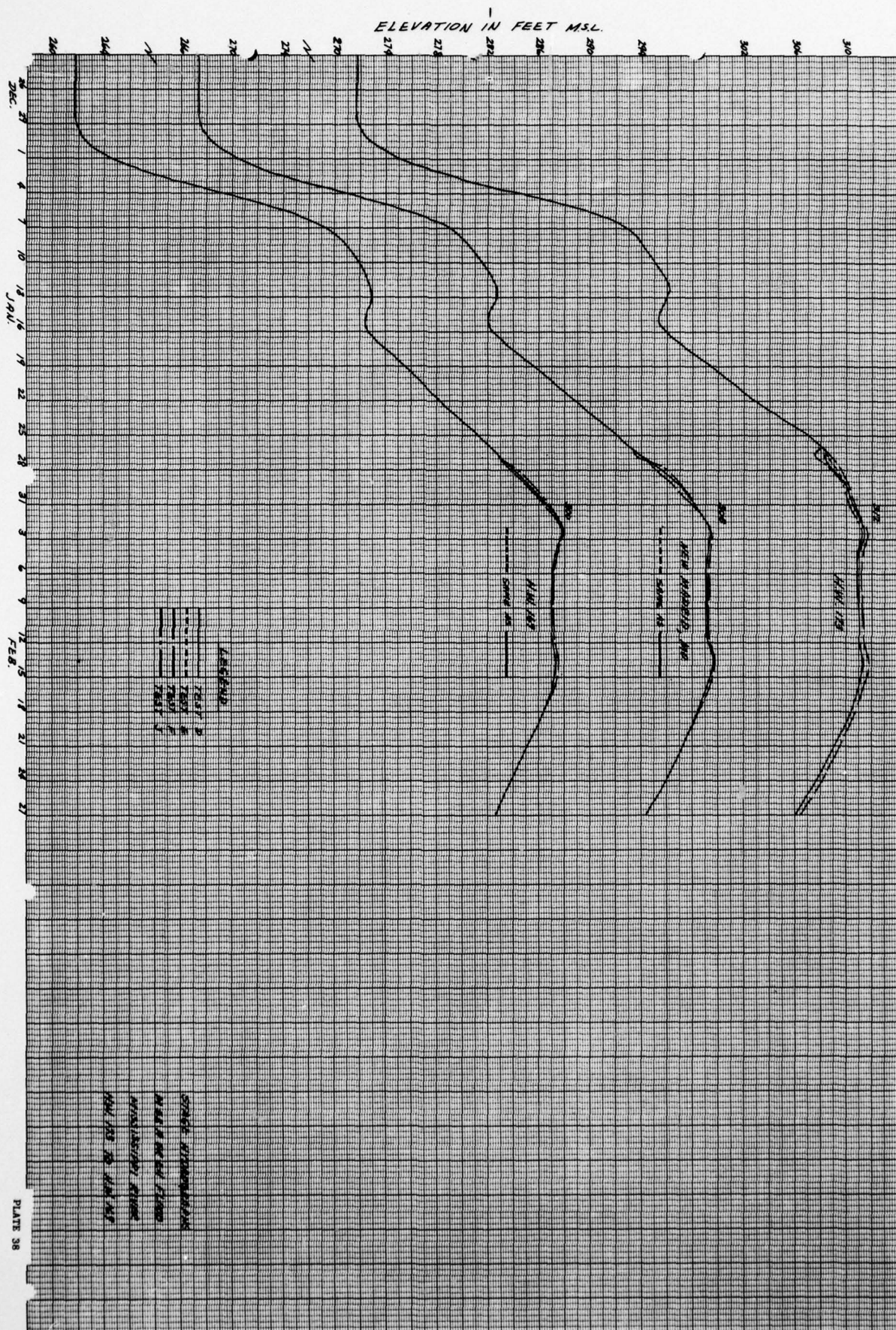




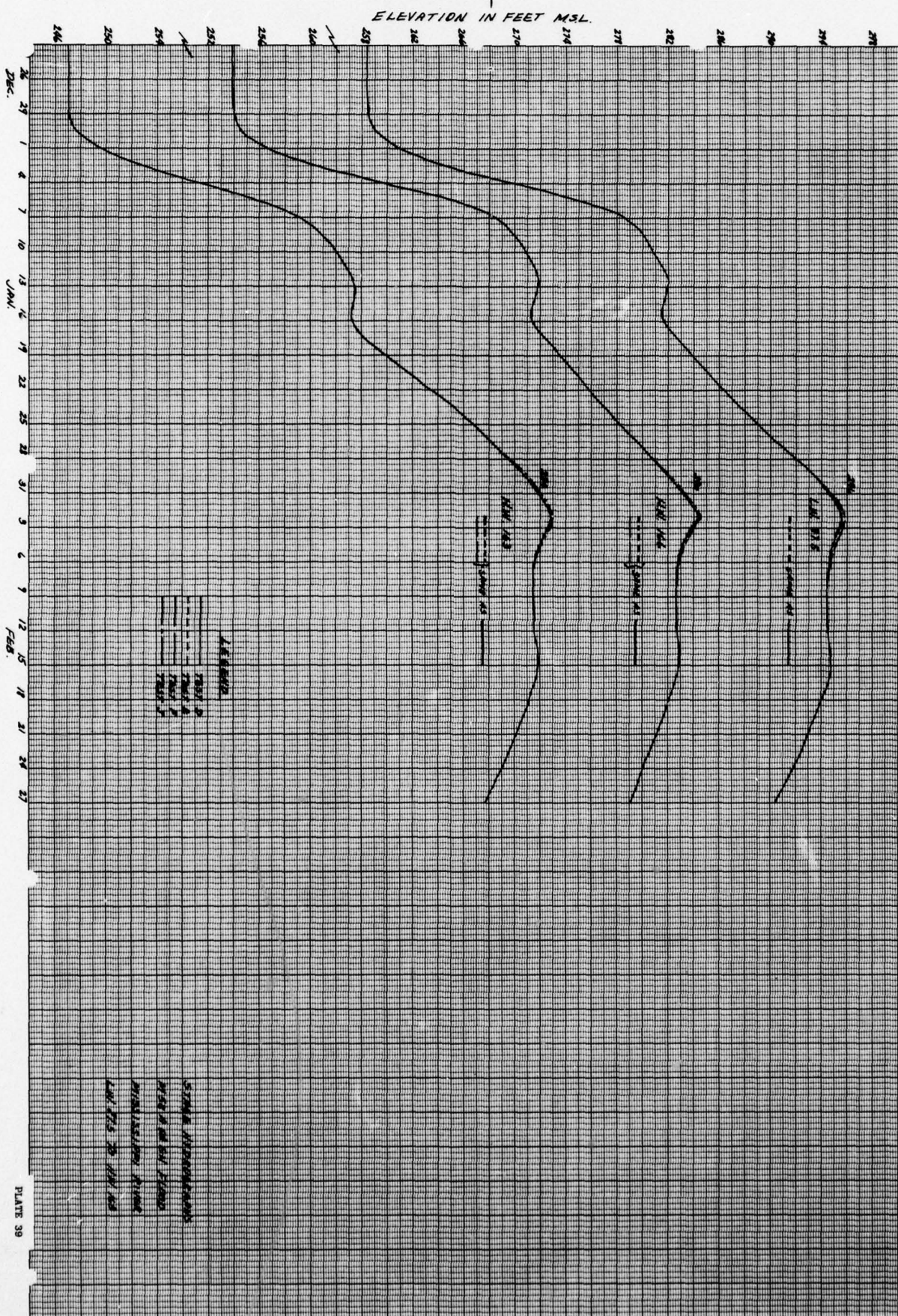








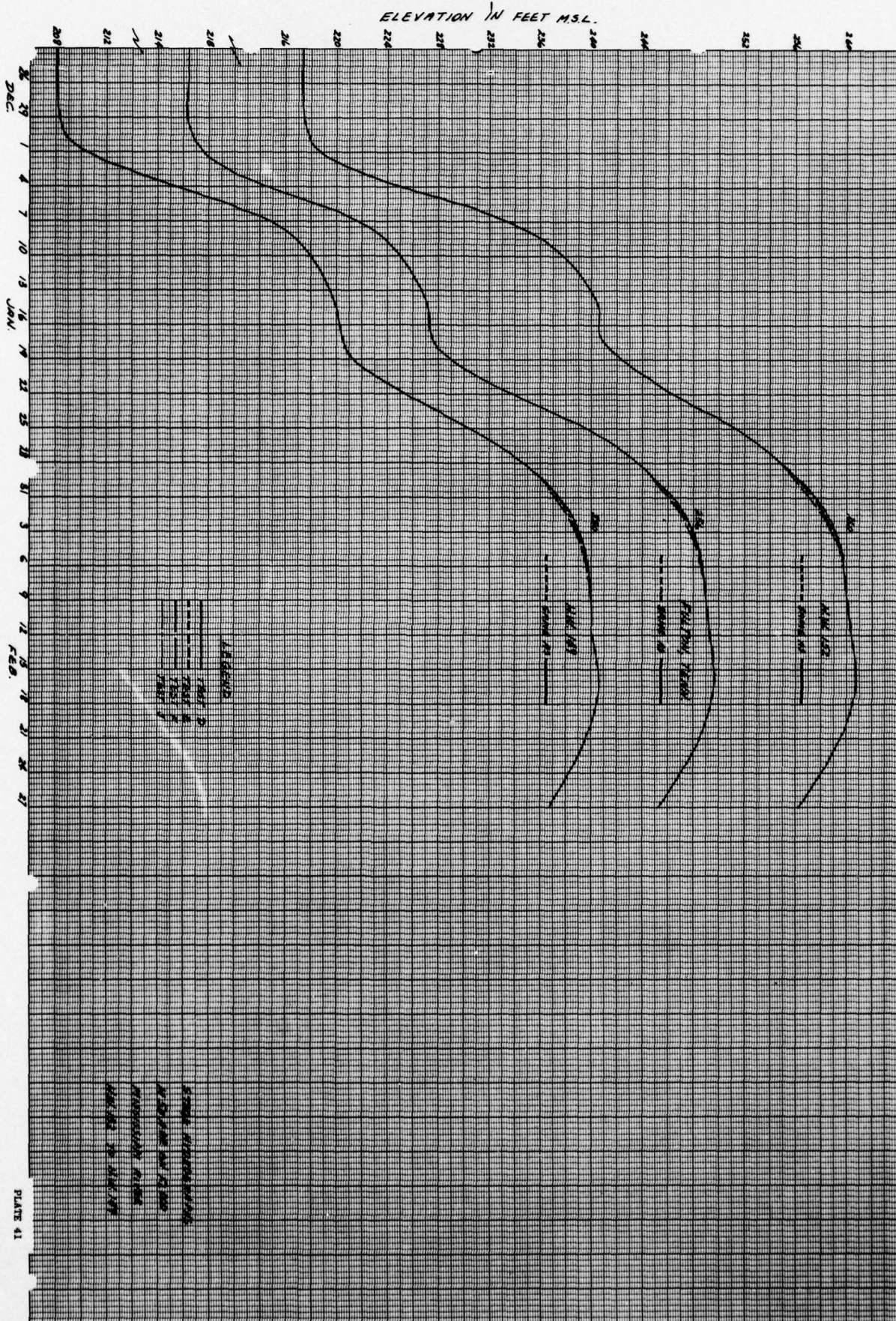










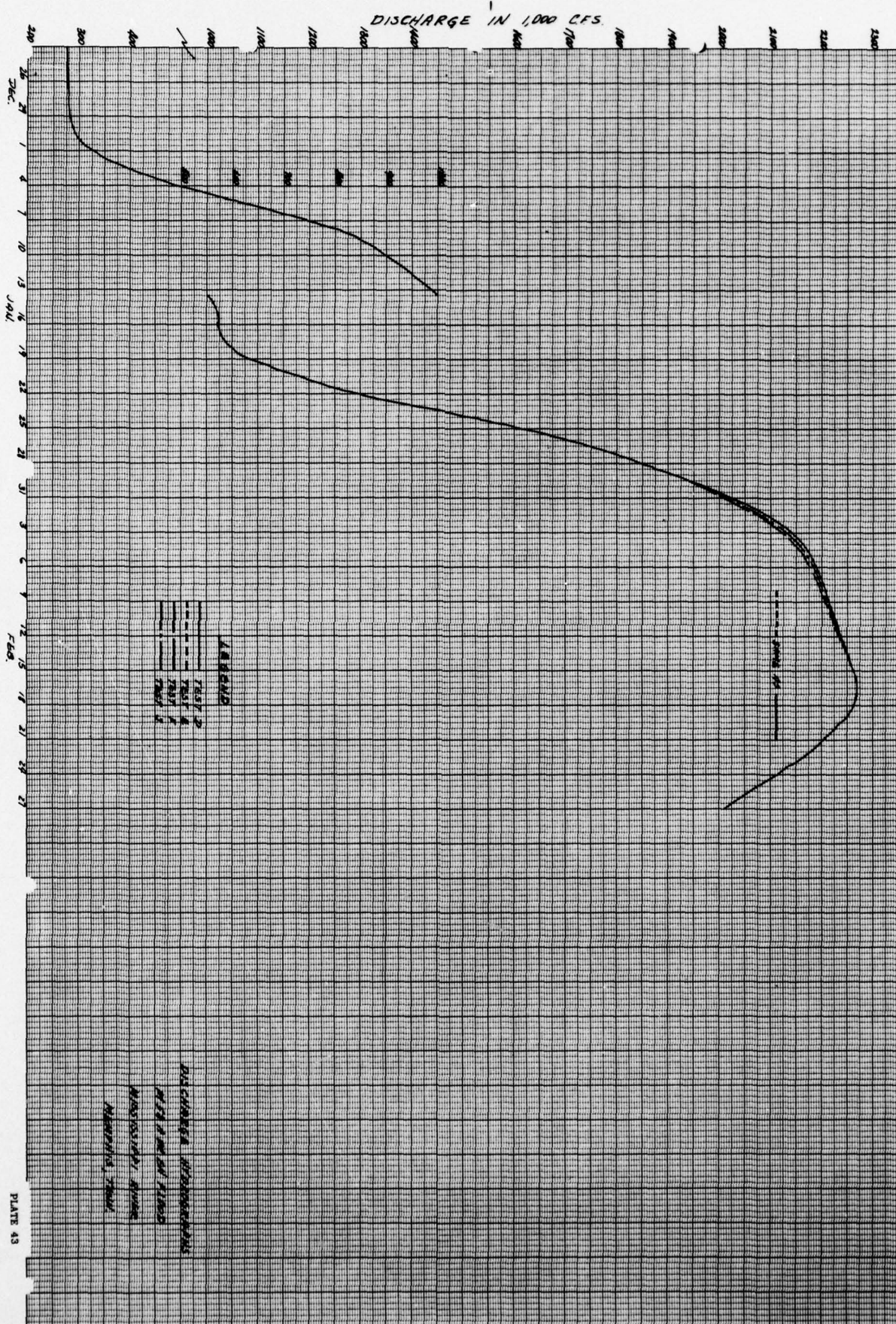


STORM ALLEGATIONS  
AT 10:00 AM AND 10:00 PM  
PROBABLY FROM  
HAILING TO HAILING

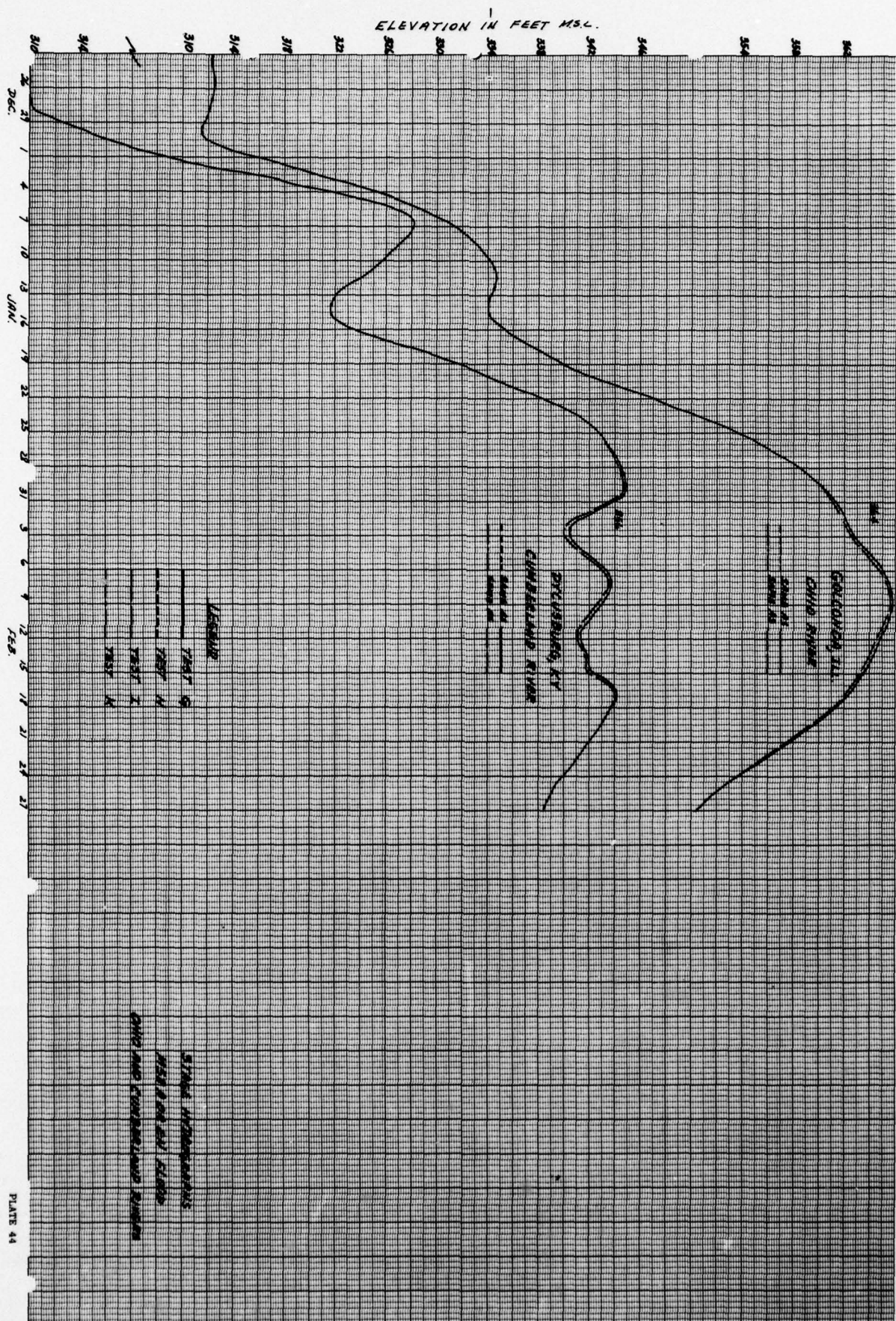






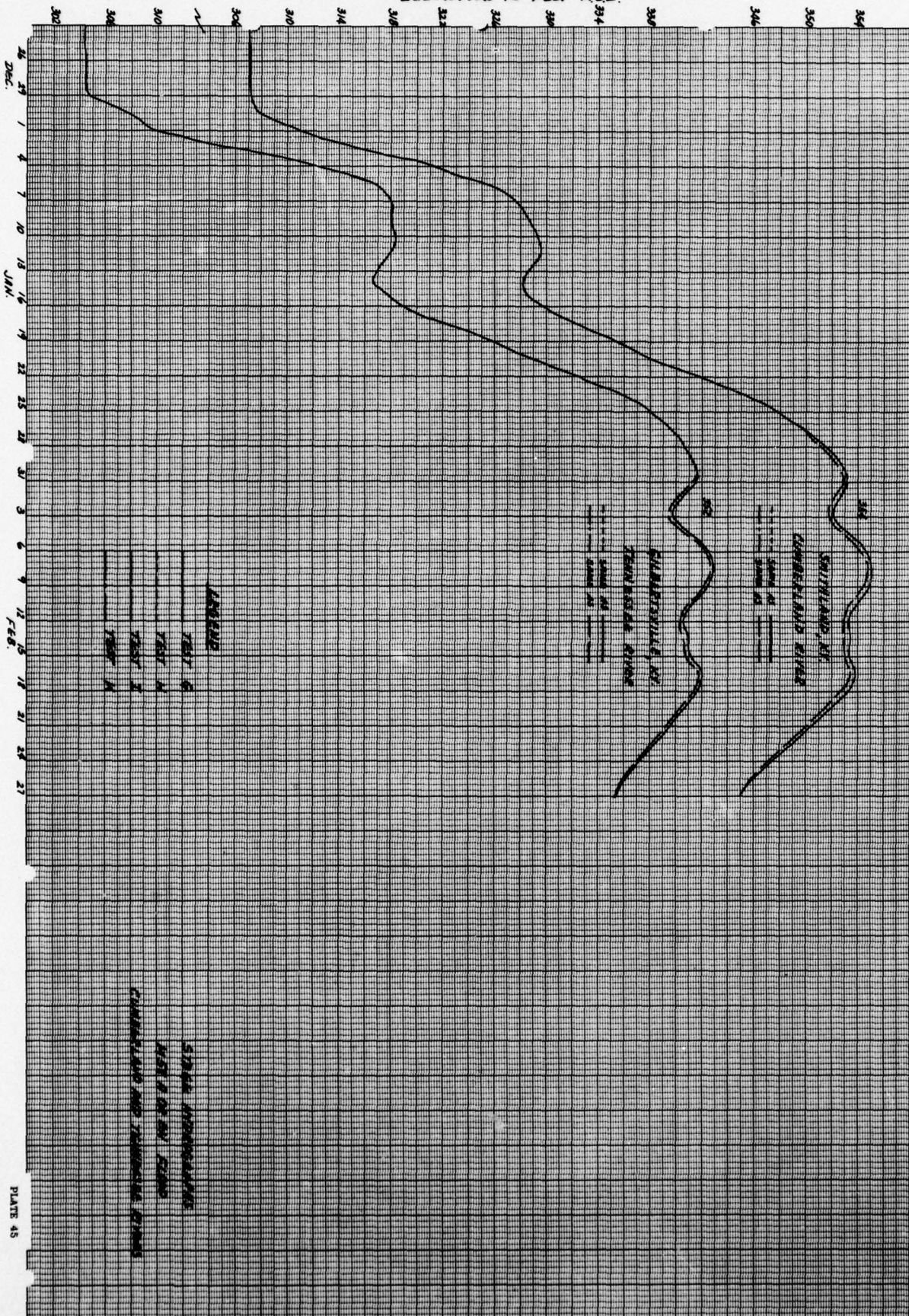




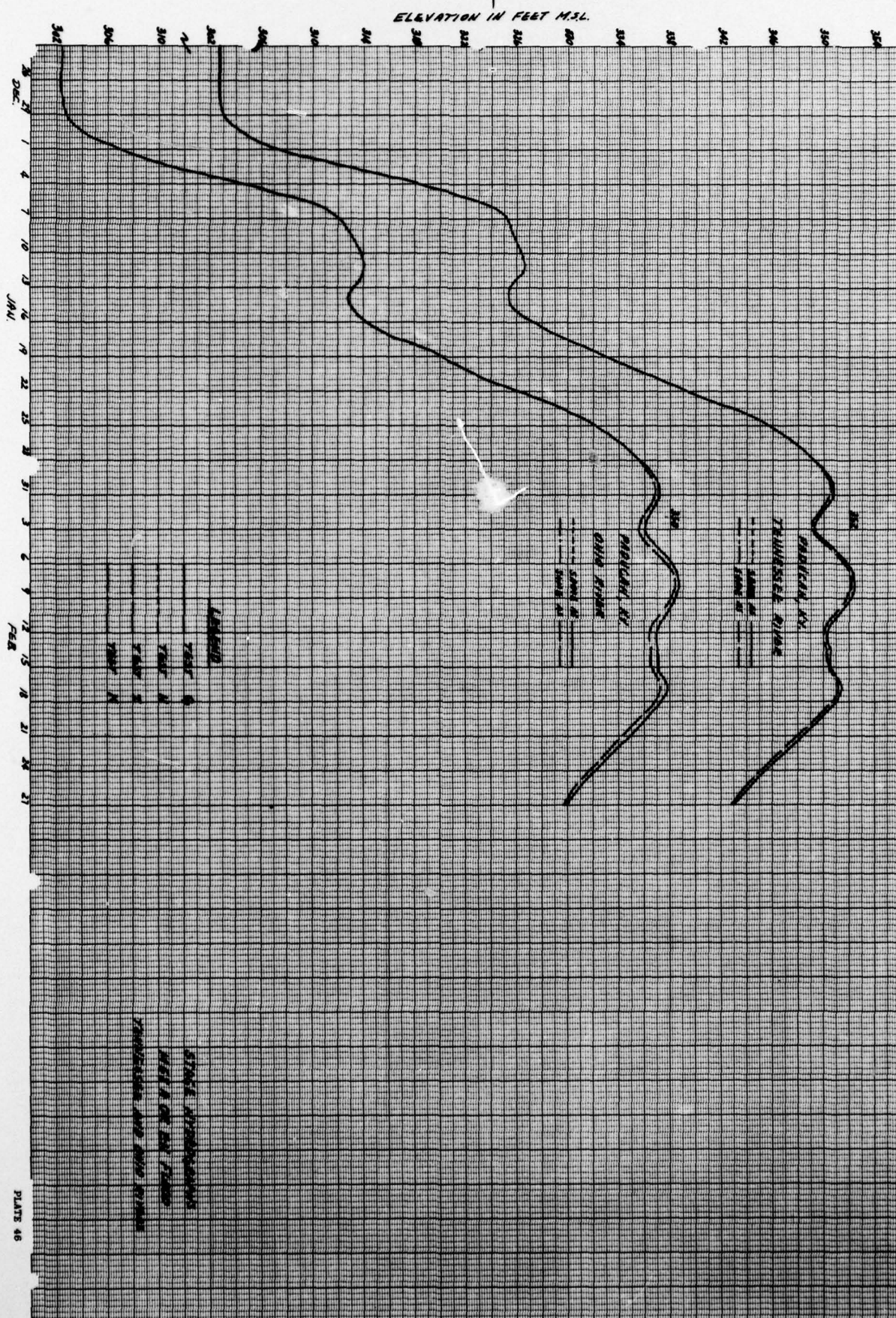




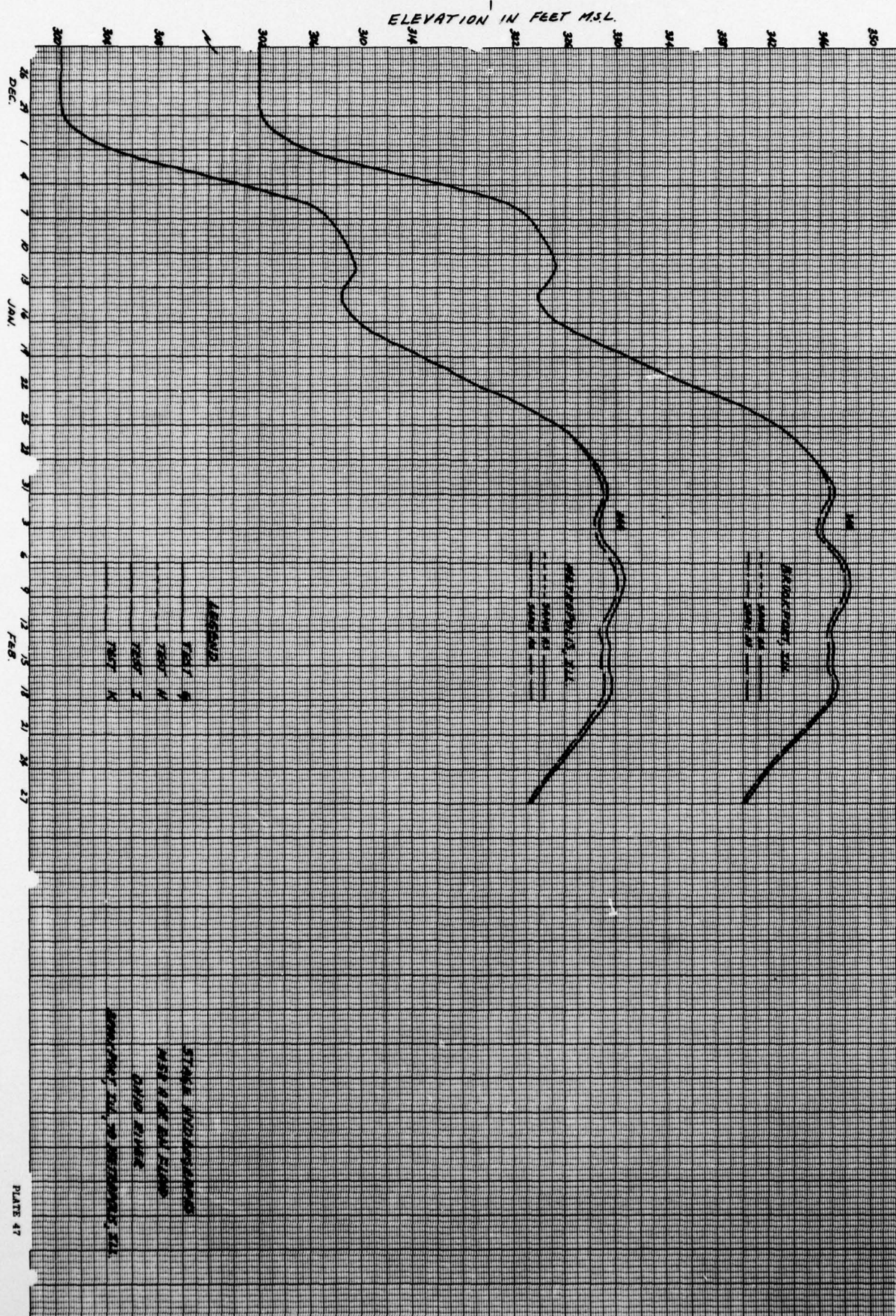
ELEVATION IN FEET MSL



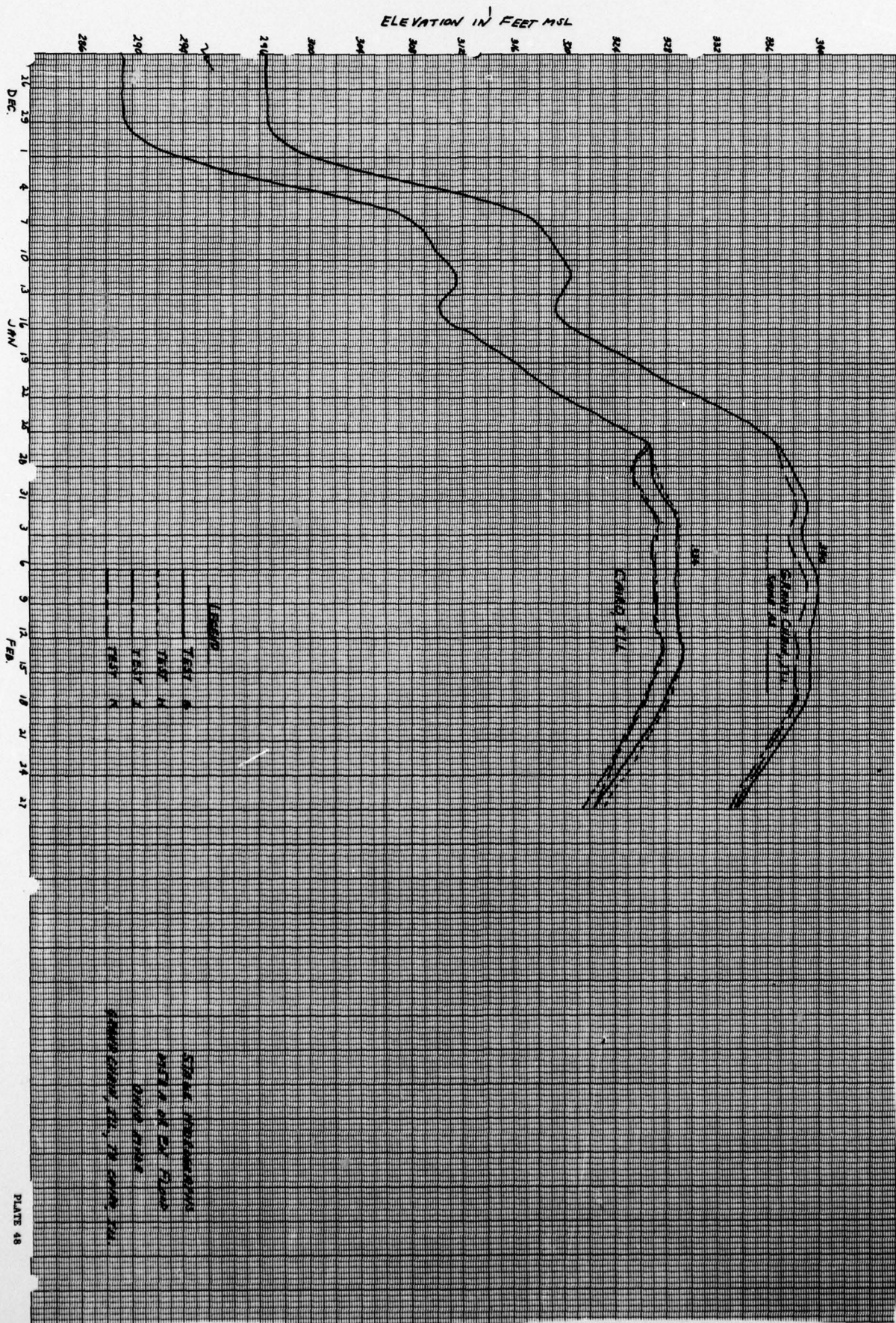




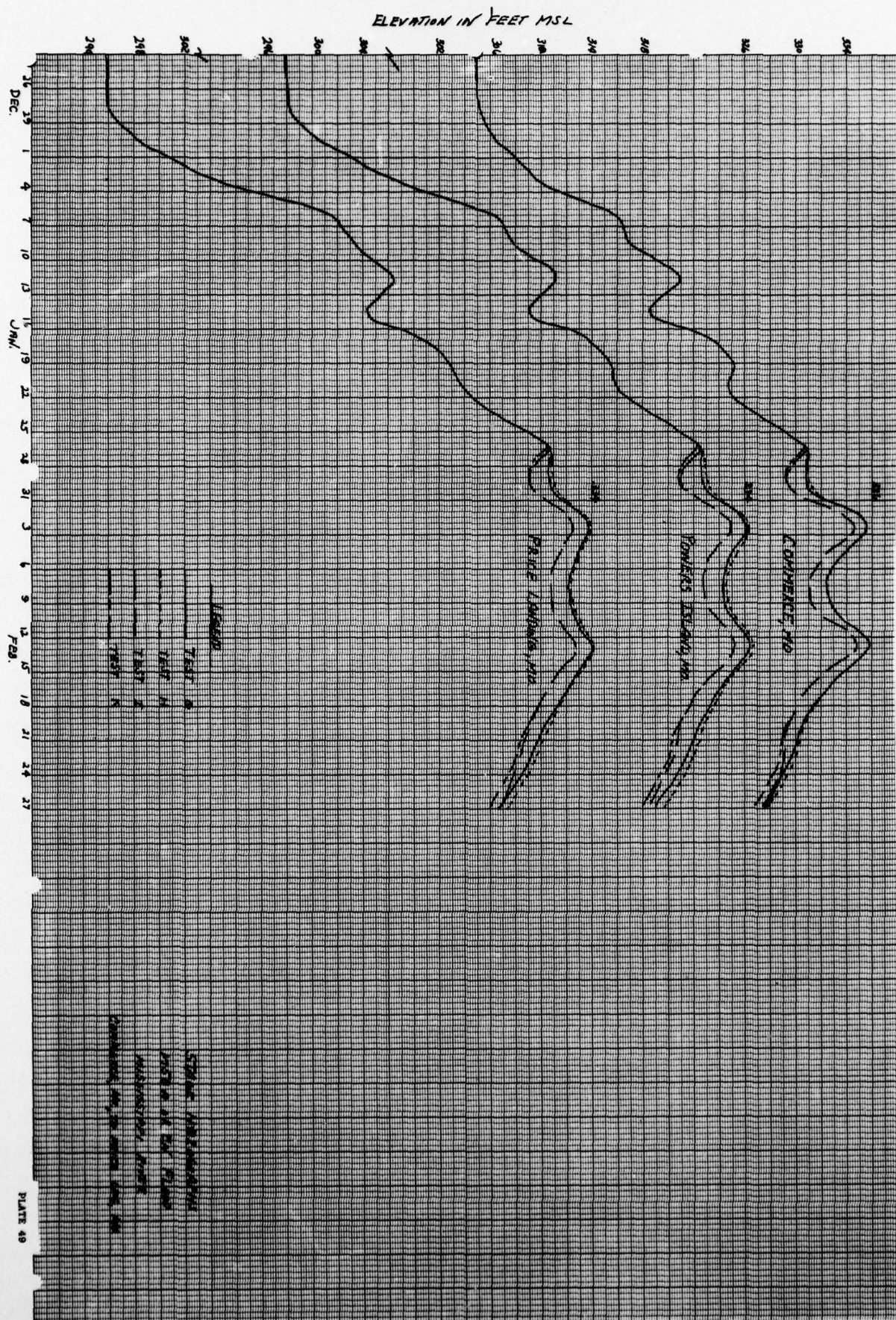




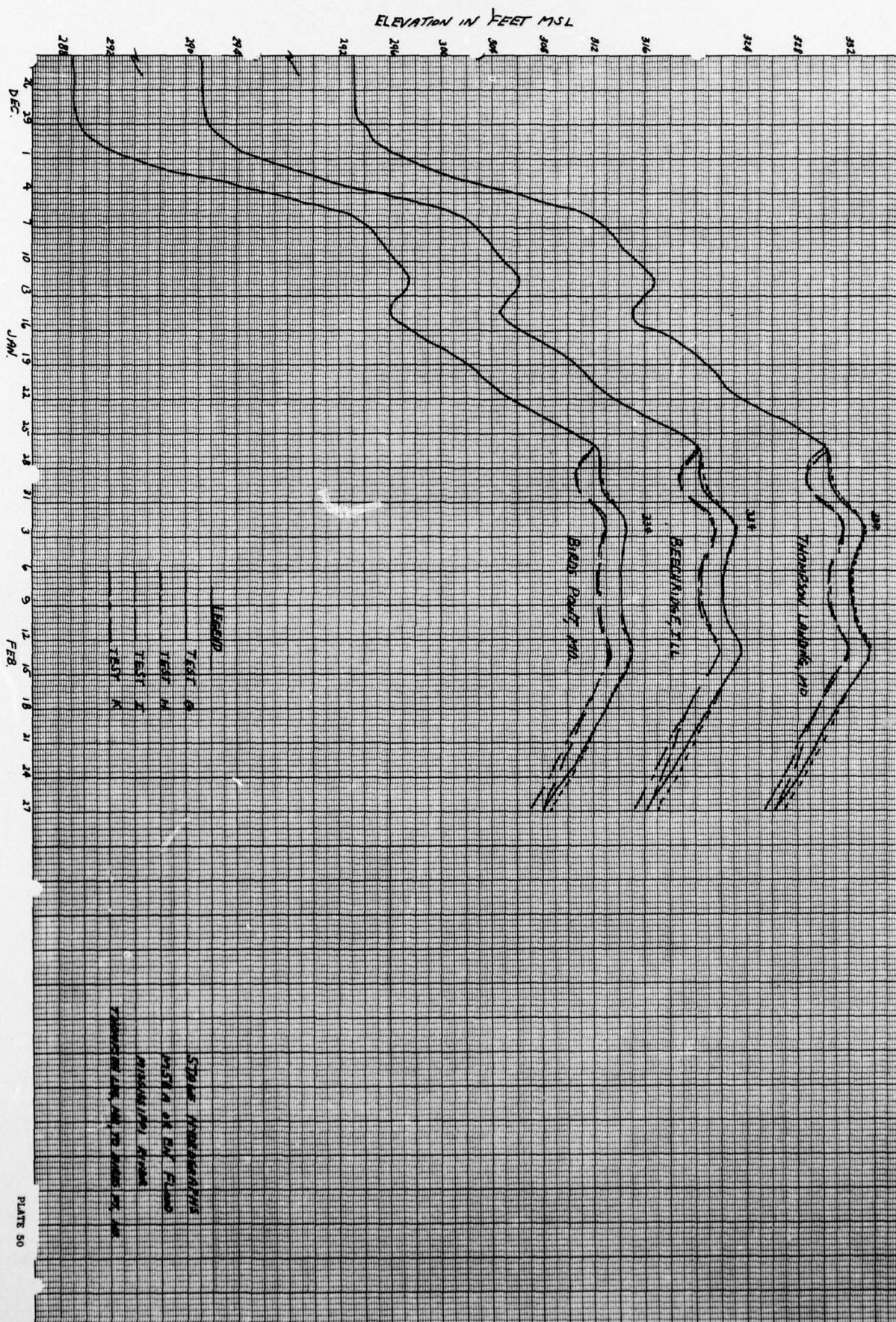




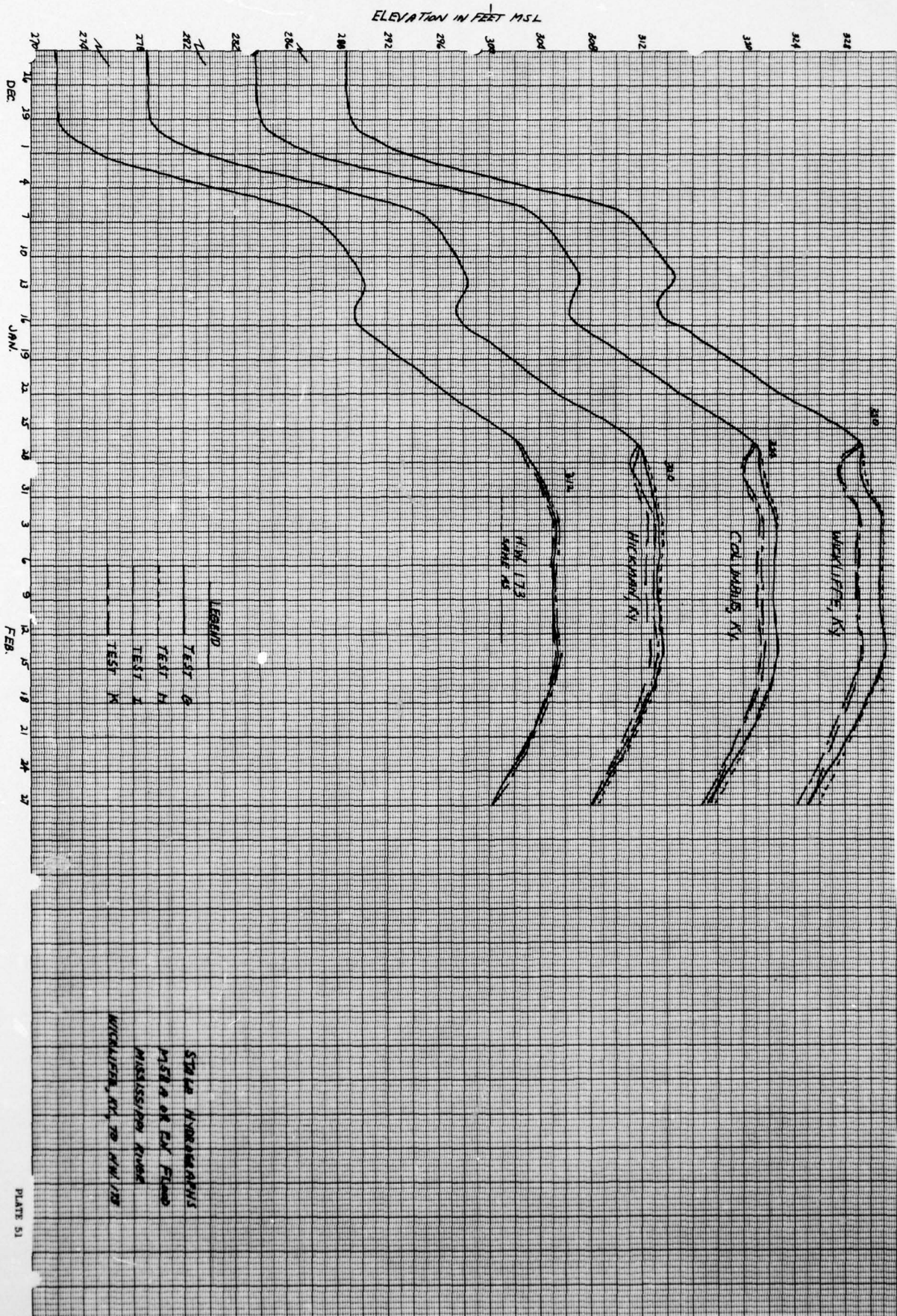












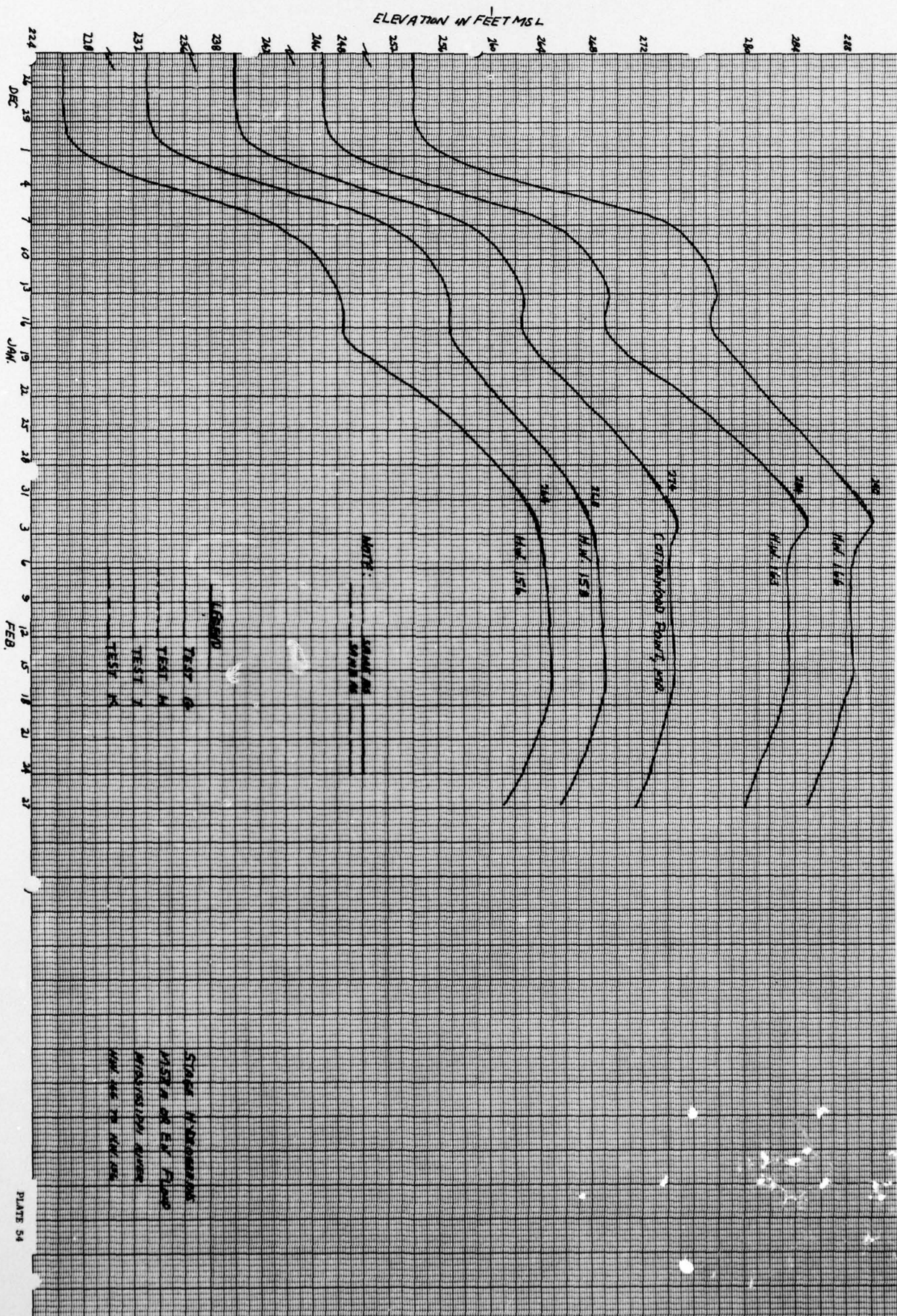




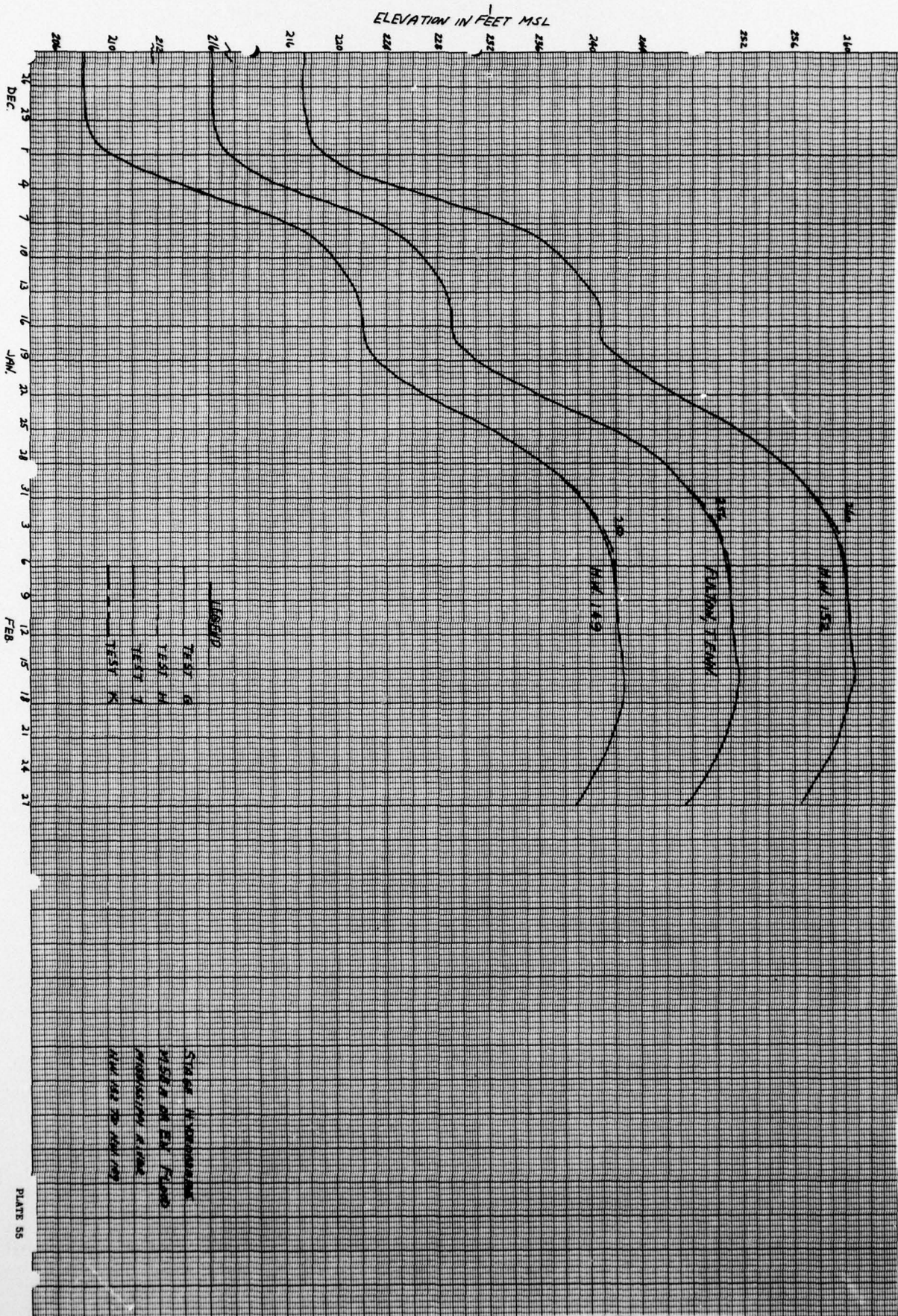








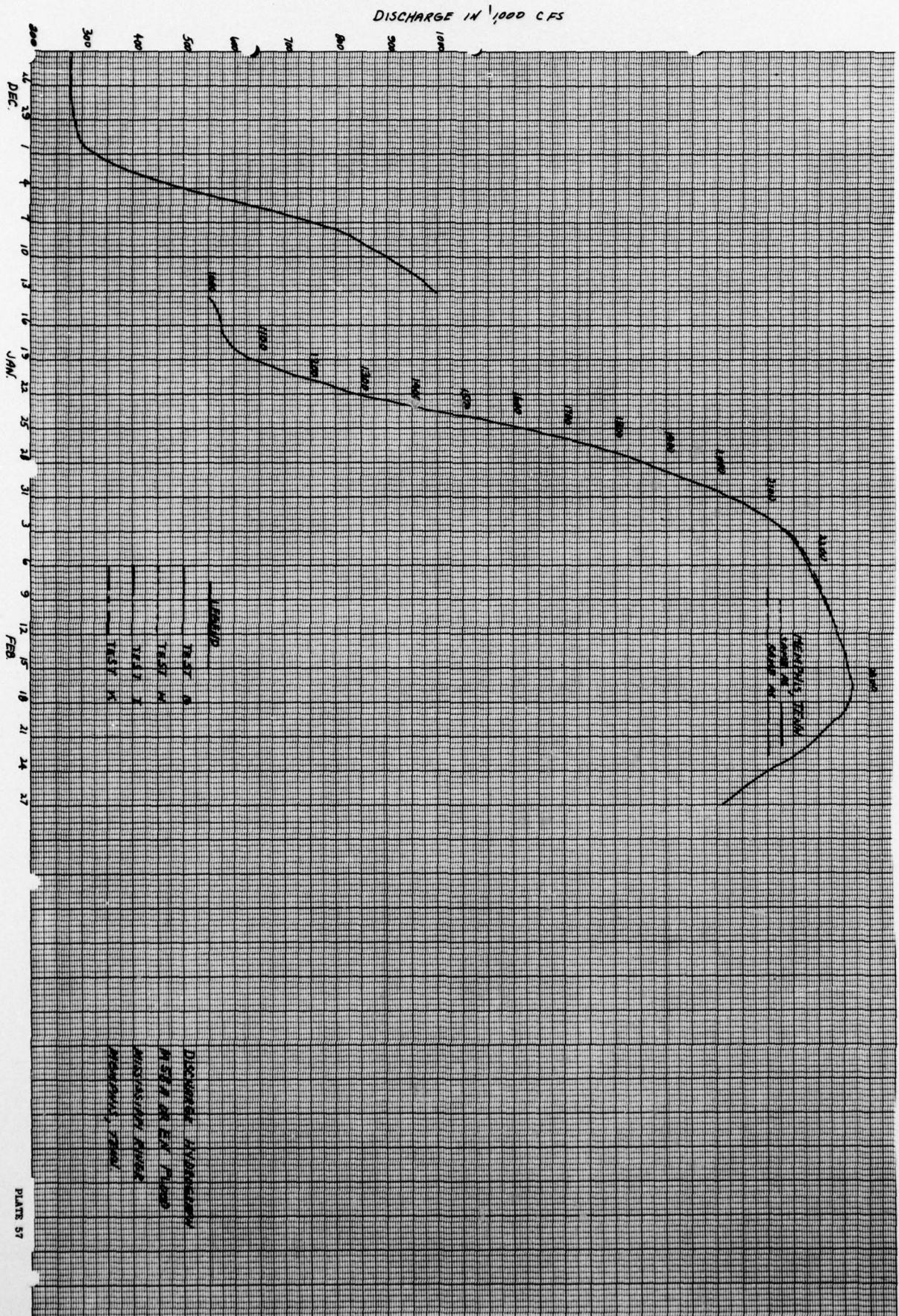














In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

United States. Waterways Experiment Station, Vicksburg, Miss.

Birds Point-New Madrid Floodway operation; hydraulic model investigation. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1978.

6, [65] p., 57 leaves of plates : ill. ; 36 cm.  
(Mississippi basin model report - U. S. Army Engineer Waterways Experiment Station ; 31-6)

Prepared for U. S. Army Engineer District, Memphis, Memphis, Tennessee.

1. Floodways. 2. Hydraulic models. 3. Birds Point-New Madrid Floodway. 4. New Madrid Floodway. I. United States. Army. Corps of Engineers. Memphis District. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Mississippi basin model report ; 31-6. TA7.W34b no.31-6